Vol. XVII Formerly CONSERVATION No. 11

American Forestry

NOVEMBER 1911

FIRE PROTECTION IN SOUTHERN APPALACHIANS
By W. H. WEBER

REFORESTATION ON PIKE NATIONAL FOREST
By C. W. FITZGERALD

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AMERICAN FORESTRY is published monthly by the American Forestry Association. Subscription price, two dollars per year; single copies, twenty cents.

MANUSCRIPTS submitted for publication should be addressed to the Editor, at the office of publication, 1410 H Street N. W., Washington, D. C.

Indexes for Vol. XVI (1910) are ready and may be had on application

Entered as second-class mail matter December 24, 1909, at the Post-office at Washington, under the Act of March 3, 1879

SPECIAL ANNOUNCEMENT

In August, extra copies of AMERICAN FORESTRY containing the following announcement were sent to all *American Conservation* subscribers:

In accordance with the announcement in the August number of "American Conservation," the "American Forestry" magazine, after August, will be sent in place of "Conservation." The statement in "American Conservation" that the subscribers to this magazine will receive "American Forestry" for the period of their unexpired subscriptions to the former is to be made more liberal, and all subscriptions with six months or less to run will receive "American Forestry" for a full six months, and those whose subscriptions will not expire for six months to a year will receive the magazine for a full year. The subscriptions to "American Forestry" of those who are already subscribers to both magazines will be extended six months or a year under the same arrangement as for those who are subscribers only to "American Conservation." This arrangement will be put into effect without the necessity for any correspondence on the part of subscribers, the only exception being in the case of those who desire to have the unexpired portion of their subscription to "American Conservation" refunded, in which case, of course, their names will be dropped entirely from the list.

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We are anxious that you accept "American Forestry" on your unexpired subscription to "American Conservation," and we are confident of our ability to make the magazine of far-reaching value and power. Forestry is the subject on which the national conservation movement was founded, and the two are so closely related as to be mutually dependent. By retaining your subscription to "American Forestry" you will be supporting a magazine which in turn is the most potent influence in support of the cause.

ROBERT P. BASS,
President, American Forestry Association.

The consolidation of these two magazines devoted to the furtherance of a national conservation policy will enable AMERICAN FORESTRY to broaden its scope of influence and better serve the cause for which it is maintained. The American Conservation Association will continue the work for which it was organized, and its influence will be a most potent one in directing legislation along the most productive lines and in keeping before the people certain essentials upon which much of their prosperity depends. The American Forestry Association has its own definite field, and the strong influences which are at work for its upbuilding, it is believed, will be reflected creditably in the magazine. The old subscribers and the new ones who have come to us from *American Conservation* can be assured that the Board of Directors and the various officers of the Association are sparing no time or effort in bringing the work of the Association and magazine up to the highest point of efficiency.

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BEST PART OF TIMBER DESTROYED BY REPEATED GROUND FIRES

American Forestry

VOL. XVII NOVEMBER, 1911 No. 11

A FIRE PROTECTION PLAN IN THE SOUTHERN APPALACHIANS

By W. H. WEBER.

THE Cherry River Boom and Lumber Company is the owner of some 50,000 acres of timberland in West Virginia. This tract is located in Webster, Pocahontas and Greenbriar Counties and includes the entire watersheds of the Cherry, Cranberry and Williams Rivers and the headwaters of the Gauley.

This region is very mountainous, the only level country being narrow flats found occasionally along the river bottoms. To describe it more graphically it is, so to speak, all up and down, since ridge after ridge rises abruptly from the narrow stream valleys to terminate in narrow rocky crests over 4,000 feet above sea level. Thus the country is naturally divided into districts bounded by water courses and high ridges which are natural fire lines.

These mountains and valleys are covered with a rich virgin forest which changes in its character according to the elevation. At 1,800 and 2,000 feet in the valleys we find mixed hardwoods, such as the oaks, maples, beech, cherry, yellow poplar, ash, etc., growing luxuriantly. Farther up on the ridges hemlock appears in mixture with them. At the 3,500 foot line red spruce is occasionally found which increases in numbers as we go upward, until at 3,800 feet it becomes the dominant or most frequent tree, topping the ridges as a rule with a heavy spruce forest.

Again, the climate is excellent as the mountain ranges are strong factors in precipitating moisture from passing cloud banks so that showers are frequent, especially in summer, and there are rarely any long periods of drought. The exception to this occurs in the spring and fall. At these seasons the leaves are off the trees, allowing the sunlight to reach the forest floor. This condition tends to dry up the leaf litter rapidly, so that after two or three days of fair weather the fallen leaves become very inflammable and form a real fire danger.

It is at these two seasons of the year that practically all of the forest fires occur, hence the opinion that these seasons are particularly dry, although in reality they may not be remarkably so. An indication of this lies in the fact that in certain instances small fires are extinguished by rain before they have been able to do any wide damage.

This brief introduction enables us to understand better what is said in the following pages, since the character of the forest, ruggedness of the country, and climatic conditions determine the methods of fire protection.

It is gratifying to mention at this point that this company is desirous, for many reasons, of conserving its forest resources. In the summer of 1909 the writer made a report upon the forest conditions of the company's lands. He found upon the cut-over lands that most species of trees, and particularly the more valuable spruce returned very rapidly, and that spruce, even before the present operation was completed, would undoubtedly be of sufficient size and in large enough quantities to be of commercial value.

The question then arose as to the best method of securing this second cutting. There were minor considerations which go beyond the scope of this article, but it was pointed out that the principal factor in securing any future return of timber would be a thorough plan of fire protection. Unless the young growth was to be protected, nothing could be produced at all. This applied to the cut-over lands, but beyond these lands there was a certain amount of damage created by surface or ground fires each year on the timberland not yet reached by the lumbermen. In the spring and fall fires were frequent throughout the hills, running for days through the undergrowth and around the bases of the timber trees until finally extinguished by rain. It was easily seen that although no one fire of this kind would kill the larger trees outright, the frequent burning charred and hollowed out the bases of the trees, eventually resulting in a high percentage of damage to the butt logs and also formed a good place of entrance for fungous diseases and for timber damaging insects. Hunters, fishermen and others were usually responsible for these fires, and they did further damage by peeling the bark from hemlock and spruce for use in making rude roofs and siding for temporary camps.

For these reasons a plan of fire protection to cover the uncut forest as well as the cut-over territory was determined upon. The work of perfecting this plan was gradual, one feature after another being put in operation until in the fall of 1910 the system was undertaken as a unit.

It is a difficult thing to place before a reader even though he be interested in the subject, a readable statement of the machinery of a plan of this sort. There are numerous details of equipment, of duties, and routes of patrol, that must necessarily be changed for each district. We will in this paper, mercifully omit these details, following the general subject along its main lines of procedure, in the hope that they may contain features of interest. Like the darky preacher who stated to his congregation that his sermon was divided into three parts, "de world, de flesh and de debbil, but de subjec am so large, bredderen, dat for de start off we will omit the world and de flesh an' go straight to de debbil."

Briefly stated then, the territory was divided into three divisions:

(1) The cut-over areas and the timbered lands.

(2) The railroads.

(3) The areas where contractors are cutting timber.

These three divisions were put in charge of a fire chief, who was responsible for all fire damage in the entire region. The woods-foreman was selected for the position since he had charge of most matters pertaining to the woodland. When the methods to be used were explained to him, he expressed himself as heartily in favor of them, and has proven well fitted to the position. The fire chief was provided with an assistant whose duty it is to keep the chief informed constantly as to the efficiency of the men and equipment. He delivers orders from the chief and supplements him in many ways.

THE CUT-OVER AREAS AND THE TIMBERED LANDS.

It was considered best to protect these areas by establishing a patrol. The patrol men or fire guards, as they are called, were selected for their fidelity, and their knowledge of the region over which they were given charge. Their duty required them to watch over a definite area of land, and to do this, each man was given a route over which he was required to travel, making a complete circuit to his starting point every four days. The patrol continued during the dry seasons of spring and fall and in hunting and fishing seasons. The routes also changed from the ridges to the stream beds at different seasons. The ridges being more carefully watched in the hunting season, and the streams while the fishing season was open. In conjunction with this the company continued a custom originated many years ago, of requiring each fisherman or hunter to secure a permit to hunt and fish, agreeing therein to assist in every way possible to prevent fire and to report any persons peeling or otherwise destroying timber. The patrols, upon meeting a hunter or fisherman requested him to show his permit and impressed upon him the necessity of careful tending of his own camp fires. Often a patrol was allowed to secure a permit for persons found trespassing without one, and in this way established friendly relations with all campers, and secured their co-operation.

Unfortunately the state legislature of West Virginia passed a law in the spring of 1911 allowing all persons the right to trespass at will upon all unfenced lands within the state. This law vitiates the permits and likewise makes it impossible for the company to inform itself as to how many campers are on the land or where they may be located.

In addition to watching the fishermen and hunters the fire guards cooperate with any settlers in their district and arrange to be present when brush is to be burned or a clearing of any sort made. They also post notices along trails and in conspicuous places to warn all against starting fire. Along the routes of the patrolmen there are shelters at different points where they may stay when storms overtake them or pass the night while making their rounds. At the three forks of the Williams River the company has built a house where one guard and his assistant are located permanently the year round.

At the headquarters of the Gauley another patrol has his house, and on the Cranberry River the patrol uses three or four different hunters' cabins and has his home beyond the company land. A telephone line is being constructed to the house on the Williams, which in case of fire will save much time in summoning aid, since this line will reach most of the settlers in the region. Another line may be carried up the Gauley in the same manner.

The patrol system has been in operation for over a year and has proven very efficient thus far, there having been no damage to timber in any district, with the exception of two small brush fires on the Williams and one on the Gauley. These were all located within a short time and extinguished before any damage had been done to standing timber.

The manner in which these fires were fought illustrates fully the fire guard system. On the eleventh of May, 1911, the guard on the Williams saw smoke rising above the trees two miles or so below his house. He immediately sent out his boy to get a couple of settlers further up the valley and set out for the fire himself. Within a couple of hours he had been reinforced by these men, and they surrounded the edge of the fire with a narrow fire line made by hacking out the undergrowth down to the rocks and then beating out the fire with shovels and throwing dirt on it when it reached the line. They had just controlled the fire when over the ridge came the fire guard from the Gauley district with eleven men. They had seen the smoke and

came to help. With this large force the fire was promptly extinguished and a man left for the night to see that it did not break out afresh.

A forester inspects the patrols at intervals during the season to suggest methods of gradually increasing their efficiency. It was on one of these trips of inspection that the writer remarked to the patrol, "Say, Jim, didn't you ever got lost in these mountains? Of course, I know that you understand them mighty well, following up the fishers and hunters, but it seems to me that even the best of men would get lost once in a while in this tangle of hills and valleys." He paused for a second, "No," he said at last, "I ain't never been what you might call lost, but wonst about five year ago, up thar on the headwaters of Cranberry, I was plumb confounded for as much as three days."

THE RAILROADS.

Coming to the second division, that of the railroads, we should first state that the company has over 75 miles of standard gauge railway lines upon the property and operates sixteen engines to haul its log, bark and pulp trains. The division of railroads is in charge of the railroad boss. It is his duty to see that the fire protection equipment is provided and operating, to inform the fire chief of any fires reported to the central office, and to send out special crews to fight fire whenever necessary. Under the railroad boss are the engineers and trainmen whose duties require them to stop and extinguish any small fires along the right of way, or to cut off and go to the nearest company camp to bring men to fight fire, at the same time notifying the fire chief through the central office.

Beyond the operating department is the track department, or section crews. They keep the track clear of inflammable material for twenty feet on either side of the right of way. They fight fire wherever found in their section, and in very dry weather patrol the track after every train, one man going to the end of his section and relaying another man from the section crew beyond.

As to equipment, every engine has a spark arrester which is regularly inspected and kept in good condition. Also fifty feet of hose with a nozzle is kept in a box on the tender. Hoes and pails are located in the section houses, and every patrol carries a pail. This fall a hand pump will be added to the equipment to make fighting fire with buckets more effective.

Along the right of way, wherever it departs from streams that have a constant flow through dry weather, water barrels are placed. The intervals between these barrels vary with the grade, and they are kept constantly full for use in emergency. There are also tank cars, which can be hauled to a fire to supply the hose line on the engine.

It is undoubtedly a fact that the railroad engines are the greatest fire menace. First, because they are constantly in every part of the timber operation, and second, because of the difficulty of preventing the throwing of sparks when on heavy grades. The spark arresters frequently get out of order and an engine will often travel a whole day before a broken arrester is discovered.

On a steep grade with a heavy load a fireman can easily imagine that the engine groans piteously to be released from its muzzle, and occasionally upon inspecting a bad break in the wire mesh of the arrester a clean hole will be found very similar to one which might be made by a vigorous thrust of the fireman's poker handle.

The organization has been in effect on the railroad during the last nine months, and in that time one large fire, covering almost a thousand acres, was set by an engine with a defective arrester. Fortunately the area burned had

FIRE STARTED BY FISHERMAN'S CAMP UNDER AN OLD SPLASH DAM

FIRE PROTECTION IN SOUTHERN APPALACHIANS

CUT OVER AREA BURNED IN SPRING OF 1911, SHOWING OLD STUBS THAT ACT AS FIRE BRANDS

SPRUCE PEELED BY CAMPERS AND BARK USED TO MAKE SHELTER

FIRE PROTECTION IN SOUTHERN APPALACHIANS

LINE MADE BY CUTTING FIRE LANE. FIRE CHECKED HERE FROM ENTERING STANDING TIMBER

A BRUSH FIRE ON WILLIAMS RIVER WAS CHECKED AND EXTINGUISHED IN THIS THICKET BY TRENCHING AND BACK-FIRING. MAY, 1911

A FIRE TRAP—BRUSH AND SLASH ALONG RAILROAD

FOREST RANGERS SOWING YELLOW PINE SEED FROM HORSEBACK NEAR PUMA CITY, COLORADO

REFORESTATION ON PIKE NATIONAL FOREST

been recently cut over and no damage to merchantable timber resulted. As it was, as many as ninety men were engaged some time in fighting it, and if it had not been discovered promptly by a patrolman and fought vigorously, a heavy loss of merchantable timber would have resulted.

The section crews were of valuable assistance during the dry period, and many minor blazes, only a few yards in diameter, were extinguished by the prompt arrival of some track walker—usually the section foreman himself—who followed up the passing trains.

The fire chief has been so vigilant that at one particular dry period of two weeks he suspended the running of log trains except in the early morning and at night—times of the day when fires are least likely to be started.

THE AREAS WHERE CONTRACTORS ARE CUTTING TIMBER.

The intermediate district not covered by the railroad or patrol is that area in process of being lumbered. The contractor or boss of the company camps is responsible for this area. There is a clause written into his contract fixing on him the responsibility for any fire damage in the district under his care, and a notice is tacked to his shanty so that all his men may see it. This informs him that for any logs burned he will not only lose the scale or tally of the logs, but in addition, he will be charged with the value of the logs thus destroyed.

At different seasons of the year there is a real danger where contractors are burning brush along the railroad to get an open place for what they call a "landing" or place to stack up the logs. A careless man will sometimes leave a brush fire while he goes off to his dinner, or trust to luck that all will be well if he allows it to burn all night. More or less fixed habits of this sort are not easily overcome, but during the nine months that the regulations have been in force no fires have resulted. This has undoubtedly been due to increased vigilance upon their part and to suggestions from passing fire guards or the assistant fire chief who inspects their cuttings from time to time.

To increase the efficiency of the three divisions described above, a forester visits the property at intervals. Written reports are turned in to the fire chief from the patrols once each month and these are kept on file for the use of the forester who goes over them carefully to note the results of each district.

The forester receives verbal reports from the railroad department and traces to its cause any fire that may be reported to the office, and wherever possible extra preventive measures are taken that a similar fire may be handled to better advantage. To illustrate this, it has been found that small hand pumps are of great assistance to track walkers in fighting small fires, and these will, in future, be added to the pails which the men now carry.

It can also be seen that as more timber is cut and new railway lines projected into the uncut forest, slight changes must be made in the different patrol districts. The forester provides for these as the operation progresses so that each division is protected. It is also planned to make minor changes from time to time in all the divisions as quickly as the men become most efficient in the duties now assigned to them. This is in accord with the plan of gradually making the plan more intensive in its efficiency.

To sum up the results of a year's trial of the plan we must take into consideration the region as a whole. It has been everywhere a season of unusual drought, and large fire losses have been sustained by neighboring lumber companies. One company has lost much standing timber as well as logs, log cars, and a railroad bridge. Another company had fire sweep through its

standing timber and through a part of the lumber town, burning several houses. In fact, the month of May was so very dry that wherever there were railroads, fires were sure to occur, and would spread with remarkable speed through the dry underbrush becoming almost at once dangerous top fires. On the Cherry River property there have been three small brush fires of some thirty acres apiece, one large fire in recently cut over lands along the railroad, and in addition a fire not previously mentioned which started from a farmer's clearing and burned into the region of the so-called railroad fire, joining it and making the total area about one thousand acres, but none of it standing timber.

In an ordinary season such fire damage would be considered large, but under the circumstances the company, so far as they have expressed themselves, consider the results obtained a success, and their losses low.

REFORESTATION ON THE PIKE NATIONAL FOREST

By C. W. FITZGERALD
Forest Supervisor

AT NO previous time since the creation of the national forests has the work of reforesting the vast areas denuded by fire and wasteful cutting been so vigorously pushed as in the past two years. There are many reasons for this; the chief one being that before this the work of reforestation was largely experimental; and it might be said that much is still to be learned. However, sufficient progress has been made with the experimental work to enable the officer of the Forest Service to accomplish beneficial results in this all-important work.

Although reforestation is being largely practiced on the greater number of national forests, the writer will deal only with the work on the forest with which he is best acquainted, the Pike National Forest of Colorado. The lands within this forest should be covered with a "protection forest," valuable primarily as a conserver of water rather than for lumber.

The location of the Pike National Forest makes it of considerable importance to the citizens of Denver, Colorado Springs, Boulder, Manitou, and the numerous other settlements in the immediate vicinity, since the watersheds that supply these communities are located within the boundaries of this forest. Realizing this fact, the forest officers, whose duty it is to administer this area, are using their utmost endeavors to better the unfortunate conditions which exist on this important area by reforesting the watersheds of these growing cities. A large proportion of the watershed has been stripped of its timber by fire or cutting, or both. Generally speaking, two methods of accomplishing the desired results have been adopted, by transplanting seedlings which are raised at the nurseries maintained by the Forest Service in the vicinity and by sowing the seed of the trees common to the area which it is desired to reforest.

After a number of localities within the Pike National Forest had been experimented with, to determine the most suitable location for a nursery, in which to raise seedlings for field planting, a small area was selected about two miles west of the town of Monument. Monument is a small settlement on the railroad between Denver and Colorado Springs, about 55 miles south of

Denver and twenty miles north of Colorado Springs. After the seedlings which are raised at the Monument nursery have attained a suitable age and degree of hardiness, they are shipped to various localities within the forest. These localities are known as plantations. The most important of these plantations are as follows: The Bear Creek Plantation (1906); the Bear Creek Plantation (1910); the Pike's Peak Plantation (1910); the Bear Creek Plantation (1911), and the Cascade Plantation (1911).

The Bear Creek Plantation, 1906, 1910, 1911, consists of some 54 acres of land, located six and one-quarter miles south and west from the city of Colorado Springs, in Bear Creek Valley, and one-quarter of a mile above the point where the famous "High Drive" enters this valley from the south. Plantings were made by the Forest Service in 1906, 1910, and 1911. In 1906, some 4,000 Douglas fir seedlings, three years old, which had been raised at the Forest Service nursery located at Halsey, Nebraska, were planted on the western end of this area. This work demonstrated very clearly that in order to get good results on these slopes great care should be exercised in placing the plant in such a position that the slide caused by wind, rain, and snow would not bury the small seedlings, which in this case protruded only four inches above the surface of the ground. Notwithstanding the fact that some of these small plants were almost entirely covered by sand and gravel, it is interesting to note that upon being uncovered, they show a growth for each year since the date of planting in 1906.

In the spring of 1910, some 27,000 yellow pine seedlings, and 3,200 Douglas fir seedlings were planted on an adjacent area. All of this latter stock of seedlings was raised at the Monument nursery, and was planted on steep, gravelly slopes, similar to the large areas on which it is intended to continue this work. The seedlings were set out about five feet apart, where possible. Nearly all of these plants were set in a hole grubbed out with a mattock. It was aimed to set the plant as near as possible to the outer edge of the small shelf caused by this excavation in order to protect it from the slide of earth and gravel.

The results of this work were very gratifying, for a recent examination found at least seventy per cent of the plants in good condition. The yellow pine seedlings did remarkably well, having made a growth during the past year of at least six inches in every case noted. The thirty per cent loss was due to various causes, the principal ones being failure on the part of the laborers to spread the delicate root system of the seedlings into a natural position, and the work of deer or rodents which destroyed the young seedlings by cutting them off close to the ground.

Work was again taken up on this plantation during the spring of 1911, when 35,000 yellow pine transplants were set out. These plants were raised at the Monument Nursery; they were four years old, and averaged, including the roots, twenty-six inches, of which fifteen inches were above the ground.

During the fall of 1910, some 5,000 plants were set out on the Pike's Peak plantation, which is located on the northeastern slope of Pike's Peak, about one mile west of the Halfway House, a station on the Pike's Peak cog road. The elevation of this plantation is 9,500 feet. Six species of coniferous trees, common to this elevation and its rigorous conditions, were included in the 5,000 plants, which were set out October 18, and an examination of the area on November 12 showed that the yellow pine had made a growth of one inch. Since the six different species in this plantation were planted at the same time, it can readily be seen that very good reasons can be had as to which of the six is best adapted to this particular locality.

Work is now in progress on the Cascade Plantation (1911), the latest

established within this forest. When experiments were being conducted to determine a suitable locality for a nursery, a small area was selected in Jones Park, about three miles above the Bear Creek plantation, in Bear Creek Valley All of the stock raised in this nursery had been removed to the Monument Nursery and to other localities except about 20,000 three-year-old Douglas fir seedlings of which 15,000 were recently removed from this abandoned nursery to the Cascade plantation, which is on the north fork of Cascade Creek, three miles west of Cascade, a summer resort, ten miles west of Colorado Springs on the Colorado Midland Railway. This plantation is located at an elevation of 9,000 feet, with an average slope of about thirty degrees and a north and northeast exposure. The 15,000 Douglas fir seedlings should do well on this area, as the stand of timber which formerly covered these slopes was of this species. In addition to the plants which were raised in the abandoned nursery formerly located in Jones Park, 15,000 four-year-old Douglas fir seedlings from the Monument nursery are being planted on this important watershed. These plants are particularly fine-looking and sturdy, and it is believed they will make a rapid and successful growth.

The old Pike's Peak State Road from Cascade to the summit of Pike's Peak, forms the northern boundary of this plantation. The land to the westward of this road having an easy slope with a southern exposure is well adapted to the planting of yellow pine. This slope has been selected as a suitable area to determine whether it will not be practical to plant two-year-old yellow pines from the nursery instead of three or four-year-old plants. Five hundred of these plants will be set out before May 10. If this experiment proves that this plan is feasible, it can be readily seen that a considerable expense will be saved in the production of these seedlings. Altogether 104,700 plants of different species have been planted on the Pike National Forest, covering an area of approximately 78 acres.

In addition to this, areas aggregating 46 acres have been planted in the vicinity of Clyde and Palmer Lake, 108,000 plants having been set out during 1905, 1907, 1908, and 1909. The larger part of these areas is located in Limbaugh Canyon, a short distance south of Palmer Lake. This work was largely experimental and served as a means of perfecting the system of raising and transplanting seedlings.

The yearly output of the Monument nursery is 500,000 plants, and as many as this should be set out each year upon the watersheds within the Pike National Forest. Great progress has been made in nursery practice during the past two years and the efficiency in handling the plants in the nursery, as well as in the field, has been increased one hundred per cent. Only last year it was considered that a field planter did a good eight-hour day's work if he planted 250 seedlings. During the month of April, 1911, a gang of six planters, working on the Cascade plantation, averaged five hundred plants per day per man.

While the men of the Pike National Forest are very well pleased with the results of their efforts toward reforestation through field planting during the past two years, they have tried another method, that of sowing the seed of the coniferous trees adapted to the locality which it is desired to reforest.

A large number of experiments along this line have been made during the past few years. Most of these experiments were conducted on a small scale, until the spring of 1910, when some 275 acres of denuded lands on the Denver watersheds were sown with 507 pounds of Douglas fir seed. This area is located on Trail Creek, just west of the old settlement of Pemberton, which is some twenty-five miles south of South Platte station. Trail Creek is a

FOREST RANGERS SOWING SEED ON THE SNOW
NEAR PUMA CITY, COLORADO

FOREST RANGERS SOWING YELLOW PINE SEED ON
DENVER WATERSHED DURING A SNOW STORM

AN EXPERT PLANTING A FOUR-YEAR-OLD YELLOW PINE ON THE BEAR CREEK PLANTATION, TEN MILES SOUTHWEST OF COLORADO SPRINGS

REFORESTATION ON PIKE NATIONAL FOREST

PLANTING FOUR-YEAR-OLD YELLOW PINE ON BEAR CREEK PLANTATION, 1911

tributary of the South Fork of the South Platte River, and the lands adjacent thereto are necessarily a part of the watershed of the city of Denver.

The seed used in this work was gathered by the men on several national forests in the state of Colorado. While results cannot be fully reported as yet, it is believed that they will be fairly good.

Of the various methods used in sowing the seed on this area, what is known as the drill or furrow method has given the best results. A furrow is made along the contour of the slope with a hoe-like instrument specially constructed for this purpose. By dragging it along the ground, a furrow is made several inches deep. A planter with a bag of seed and a rake follows the man with the furrow maker, and drops seed into the furrow at intervals of about one inch and then rakes the soil over the seed.

During the fall of 1910, an area comprising some 144 acres on the northeastern slope of Pike's Peak, near the Halfway House, on the Pike's Peak cog road, was sown to Engelmann spruce, Douglas fir, and yellow pine seed, various methods being employed. Owing to the lateness of the season when this work was done, results cannot be accurately given as yet.

During the winter of 1910-1911, the officers of this forest were informed that it was the desire of the district forester that extensive experimental work be done along the line of sowing yellow pine seed on the snow, especially on the watersheds. Some 3,600 pounds of yellow pine seed, which had been gathered by the men of the national forests in Colorado, Wyoming, and South Dakota, were allotted for this work, and an expert was sent out to make a reconnaissance and select suitable acres on which to do the sowing. During the month of February, 1,150 acres of land were sown to this yellow pine seed in different parts of the forest. About 900 acres of the total area are located on the watersheds of the North and South Forks of the South Platte River, from which the city of Denver obtains its water supply. The remainder of the sowing area is located on the watershed of Fountain Creek, from which a part of the domestic and municipal supply of Colorado Springs is obtained.

It was considered that the most favorable time to sow this seed was during a snow storm, and consequently the forest rangers in charge of the different districts in which the sowing was to be done awaited the time when the ideal conditions existed, when they took up the work of sowing the two to three hundred acres on their districts. It was no easy task to sow on steep, rocky slopes with the thermometer registering from ten to twenty degrees below zero and with the snow falling. Some of the rangers were fortunate enough to have areas which permitted of their sowing the seed from horseback. This method is believed to be really more effective than sowing on foot, because the seed, being thrown from a considerable height, sink deeper in the snow.

The method of sowing seed by broadcasting in the snow and on unprepared ground, appeals very strongly to the forest officers who realize the magnitude of the task before them, by coming in daily contact with the vast areas which it is their duty to clothe with a good stand of timber. These men realize that they will not see their efforts result in a merchantable stand of timber, but they do know that if they can get a six to eight-inch growth yearly, on the plants which they are now setting out, they will have the satisfaction of seeing this same young growth holding the snow and thereby conserving the water supply. It is this knowledge that encourages the men to put forth their best efforts to successfully accomplish the important task before them.

FIRE PROTECTION IN THE NATIONAL FORESTS

By EARLE H. CLAPP.

Concluded from the October number.

EQUIPMENT.

FOR efficient fire protection it must be decided in advance what equipment is necessary, and this must be obtained and so distributed as to cause the least possible delay in case of fire. It is of the utmost importance that so far as possible everything be made ready in advance.

The construction of tool boxes at strategic points throughout the forests, for instance, at the crossing of important trails, ranch houses, at section houses in railroad patrol, etc., has already been discussed.

During the past two years the equipment of tools on practically all the forests has been materially increased for distribution to these tool boxes. Standard sets for specified numbers of men have been worked out depending upon the peculiar needs of each case. As everywhere in fire fighting, the tools ordinarily used consist of shovels, rakes, hoes, saws, axes, mattocks, picks, potato hooks, gunny sacks, squares of canvas, small Navajo blankets, and files for sharpening tools. In addition cant hooks, lanterns, cooking outfits and tents are furnished. Canteens and water bags must always be available. Attempts have been made to improve the tools ordinarily on the market, but so far except in the case of shoulder and saddle bags, with hose attachments for direct application of water on the fire, and chemical apparatus, designed by Supervisor Adams on the Arkansas National Forest, little progress has been made. Considerable progress, however, has been made in the better selection of the tools available in the markets. In addition to purchases, arrangements are sometimes made in advance in emergency. Field glasses are ordinarily supplied to lookouts and patrolmen who need them.

Pack trains have sometimes been secured where there is valuable timber, the danger from fires is great, and no other means of transportation is available. In several instances such pack trains have more than paid for themselves in fire protection and permanent improvement work during one season. In some cases where it is easily possible to secure pack animals, it has been necessary to purchase pack saddles, etc., and locate them at convenient places. On many forests it has been found desirable to make arrangements in advance for pack animals when there is any possibility that they will be needed.

The effectiveness of a fire fighting force is greatly increased by proper food supplies. Aside from the question of transportation various plans depending upon local conditions have been devised for getting supplies to the men quickly and cheaply. Very often arrangements are made in advance with stockmen for the purchase of either beef or mutton on the range. During the fire season rangers frequently purchase a larger amount of supplies than usual for emergency use. Wherever advisable special arrangements are made in advance at ranch houses, or at stores in order to make sure that suitable supplies in sufficient quantities can be obtained. It has been found helpful to prepare for immediate use, lists of supplies which will be needed to furnish

a specified number of men for definite periods. Officers are instructed to furnish a well balanced ration of substantial food.

On many forests fire guards are being appointed at a reduced salary and are furnished with subsistence. Food supplies are then purchased under competition in order to get reasonable rates, and suitable quantities of the supplies so purchased and taken to the field headquarters are available for patrolmen or in case of fire for fire fighters.

ORGANIZATION.

Since the organization for fire protection upon the forests is of the utmost importance, a great deal of attention is being given to this phase of the work. The regular and permanent force on each forest consists of a supervisor, a deputy supervisor if one is needed, clerks, and rangers who may be assisted by forest guards during the season of heavy administrative work and the fire season. The supervisor with the assistance of his deputy, has charge of the work on the forest and is directly responsible for efficiency and results. Use may often be made of clerks in handling the commissary department in emergencies. Rangers with their assistants constitute the field force proper. Depending upon the need, there may be one or more in each district. The field force act as patrolmen, fire fighters if need be, and so far as possible without detriment to fire protection, carry on the administrative work.

Experience has shown, however, that this regular force is not sufficiently flexible for the best results. It may be necessary because of unusual menace or bad fires to increase greatly the number of patrolmen, and also the number of fire fighters. Accordingly, practically all of the permits for the use or occupancy of the forest require assistance where needed in case of fire. The liability for work depends upon the size and the nature of the permit and upon the responsibility for the fire. Payment is made to permittees for assistance rendered beyond the requirements of the permit. The general character of such requirements is indicated by the following clause from a timber sale contract.

> "During the time that this agreement remains in force I will, independently, do all in my power to prevent and suppress forest fires on the sale area and its vicinity, and will require my employees and contractors to do likewise. I hereby agree, unless prevented by circumstances over which I have no control, to place myself and my employees at the disposal of any authorized forest officer for the purpose of fighting forest fires, with the understanding that if the fire does not threaten my property or the area embraced in this agreement, I shall be paid for services so rendered at the rate or rates to be determined by the forest officer in charge, which rate or rates shall correspond to the rate or rates of pay prevailing in the..... .....National Forest for services of a similar character at the time the services are rendered, provided, however, that if I or my employees, subcontractors, or employees of subcontractors are directly or indirectly responsible for the origin of the fire, I shall not be paid for services so rendered."

While having no connection with the organization, it may be well to mention that all permits where necessary include further provisions to prevent fire: In timber sales for brush disposal and the cutting of dead stubs; in grazing permits to prevent the leaving of burning camp or branding fires; in power permits for the clearing of a right of way for transmission lines; in railroad stipulations for the clearing of the right of way, the use of spark arresters, or the use of oil or electricity for motive power, etc.

In order to extend still further the reserve force for patrol and fighting,

it has been found necessary under some conditions, to appoint selected men at a per diem paid only when work is actually done. Such men are usually public spirited citizens who are glad to assist in the work of fire protection. On the Deerlodge National Forest in Montana during the present year it has been found that this plan increases materially the flexibility and efficiency of the force; in fact, the employment of one guard under this plan makes it possible on the average to secure the services of twenty additional men as laborers.

On many of the forests where it does not seem necessary to appoint men on a per diem basis, definite arrangements have been made in advance with experienced men to act as foremen of fire crews or as ordinary laborers. The arrangement which usually consists of a promise of assistance when called upon is as far as possible made to include foremen in mines, lumbering camps, etc. Foremen of fire crews are frequently paid higher wages than the men.

In addition to the classes of assistance already indicated, it is usually possible to secure the services of large numbers of other men if needed. This, however, may cause delay, and it may be necessary to take unsatisfactory workmen, or be impossible to get sufficient numbers. On some of the national forests special conditions obtain so that it is possible to secure comparatively large bodies of good men from one place on short notice. Such, for instance, are those forests which are adjacent to Indian reservations and in some few cases forests which are adjacent to forts.

In very great emergencies where property of great value is at stake and there is danger of the loss of human life, it is always possible to call for assistance from the United States Army. It is planned, however, to make this call a last resort because of the great expense of getting men to the scene of action, and because the centralization policy of the War Department makes it impossible under ordinary circumstances to have small forces of soldiers scattered through the forests.

Provision for the regular forest force to be supplemented in case of need by various reserves as discussed, does not emphasize sufficiently the occasional and urgent need for transfers of men between forests. During the serious fires of the summer of 1910 it was found that the need for laborers was not so great as the need for experienced men to take charge of fire fighting crews or to carry on patrol work. To some extent this situation was remedied by the transfer of rangers. Such action may, however, be dangerous or impossible because the regular force is comparatively small. Gradually, however, as the number of men with some training increases, this problem may solve itself and it may easily be possible to secure the services on one forest for transfer to another, of good men outside of the regular force.

PATROL.

The arrangement of patrol for a forest while apparently very simple, is actually difficult, and this is more apparent when one realizes the many adverse conditions under which it is frequently necessary to work and the necessity in spite of these conditions for getting good results. All of the forest must be covered, it must be covered frequently enough to prevent disastrous fires, and not more frequently than necessary, thus reducing the funds available and the patrol needed in other places.

Patrol on the national forests is of two general kinds: (1) that from lookout points; and (2) that by men who walk or ride or depend upon some other means of transportation. The lookouts are either stationed on more or less commanding peaks and remain there constantly during dangerous periods, or visit the peaks at specified hours and in addition, after electrical storms. It has been found that the highest peaks may not under some con-

ditions answer so well the purposes of intensive patrol as lower peaks from which it is impossible to get a nearer view of a smaller area. On some forests it has been found advisable to use the higher peaks when this is possible, and to abandon them for the lower peaks and the closer patrol if the atmosphere becomes smoky. The chief advantage of lookout patrol is the comparatively large area which it is possible to keep constantly in view. Lookout points are much more effective when in direct communication by telephone, heliograph, or otherwise with the headquarters of the forest. The great disadvantages of lookout patrol are that it gives little or no opportunity for administrative work, and it does not enable the patrolman to keep in close touch with forest users, residents and transients.

The topography of some districts is such that lookout patrol is impossible, and it is necessary to depend entirely upon men who ride or travel through the country. In many ranger districts it has been found absolutely necessary to keep in close touch with forest users, residents, freighters, campers and hunters, and also other classes of transients.

For efficient riding patrol where contact with any class of people is not the principal object, it is necessary to follow the high ridges and to get on to peaks or into open places from which the surrounding country can be seen. Riding patrol may be coordinated to a greater or less extent with the administrative work which is necessary during the fire season. In ranger districts where there is only one man it is obviously necessary that he perform both duties.

On forests which are traversed by railroads using coal-burning locomotives, it is frequently necessary to detail special patrolmen to follow all heavy trains, and in some cases to follow every train. Launches are useful upon the larger lakes where a good view can be obtained of the surrounding country. In districts with good roads much might be gained by the use of motorcycles.

In addition to the regular patrol it has sometimes been found advisable to secure the services of ranchmen or others, who with little or no riding are able to see a considerable part of a forest. These men in many cases do no more than report the fires discovered to the nearest forest officer. Fires are frequently reported as already indicated by patrolmen employed by the state, associations, companies, or individuals cooperating with the Forest Service.

On very few of the forests has it been found possible to adopt entirely any one form of patrol. The best results are obtained by a combination of lookout and riding patrol depending upon the conditions in each case. In Montana and northern Idaho the lookouts are used on the higher peaks and cover most effectively the country immediately surrounding these stations, while patrolmen ride through the lower valleys or along the ridges which overlook them. The fact that administrative work must be carried on during the fire season prevents the use of lookout patrol alone.

The area which can be covered by a patrolman depends upon a number of varying conditions which include: (1) The value of material to be protected and the degree of risk; (2) the frequency with which patrol is necessary; (3) topography; (4) whether patrol is from lookout points or by riding; (5) upon available means of travel and communication; (6) the clearness of the atmosphere; (7) the experience of the patrolman and his knowledge of the country; (8) the cooperation received from adjoining ranger or patrol districts or from adjoining forests; (9) the cooperation which may be received from other sources; (10) the necessity for administrative work; (11) means of subsistence.

There are a number of other points which must also be considered in providing for patrol on any forest. The force must be exceedingly flexible. At times during the fire season after light rainfalls, it may be possible for a few

days to use lookouts and patrolmen on other work, and on the other hand, the situation may become exceedingly dangerous, and it may be necessary to increase materially the number of men employed. During a bad season the atmosphere may become very smoky, and it may be necessary to abandon all lookouts and to depend entirely upon other patrol. For instance, during the bad fires of 1910 in the northwest it was impossible for the patrolmen to see fires until almost on them. During different parts of the fire season variation in patrol may be necessary because of the locations at which fires may start. At the beginning of the season, for instance, all the fires may be in the lower valleys, while the snow is still melting in the higher mountains or the movement of transients may also have a very material effect upon the possible location of fires.

While there is any fire danger the patrol must be regular. Patrolmen and lookouts must be on duty every day, including Sundays and holidays. Men who are incapacitated must be replaced immediately. When fires are discovered provision must ordinarily be made for a continuation of patrol while the fire is being extinguished, otherwise it may be possible for others to obtain a serious start before discovery. To insure regularity, it is necessary in many cases to make arrangements for the transportation of mail and supplies to lookouts and patrolmen.

On practically all of the national forests it is necessary each year to break in a number of green men, and some provision must ordinarily be made for their instruction and training. Much depends during the fire season upon keeping open existing lines of communication. It is therefore necessary to provide for frequent testing of all telephone lines, and frequently upon the more important telephone lines a special daily or periodic patrol is advisable. Where tools are stored at various points on the forest, it may be well also to require patrolmen to make sure at frequent intervals that they have not been removed, and that they are returned promptly after use at fires. Lookouts are usually required to communicate daily or at regular intervals with the supervisor's headquarters, and on some forests provision also is made for checking occasionally the work of the more inexperienced patrolmen who may not be well known to the supervisor. On many of the forests the supervisors require patrolmen to carry with them constantly certain tools, and in parts of the northwest the men are also required to carry certain amounts of supplies.

FIGHTING FIRES

Everything should be in readiness for immediate action when fires are discovered. The patrolman or ranger should know just where to go or to send for his men in order that he may secure a sufficient number of the right kind of men at short notice. In practice it has been found exceedingly difficult to judge the number of men needed, and to keep the right number until all danger is past. Care must be taken that the force is not too large in order that the expense of fire fighting may not be increased unnecessarily. It must be certain that the proper equipment is sent and that the force will be promptly and continuously supplied with suitable food. Upon arrival at the fire, camp sites must be selected; the officer in charge must at once size up the situation and organize his crews. In the attack on the fire advantage must be taken of all conditions which will be of any help, such, for instance, as variations in a stand of timber, topography, open areas, etc. No two fires are alike, and each one to be handled to the best advantage must be attacked in a different way. General directions in regard to fighting fires are helpful to the men in charge, but experience is better. Finally, fires must not be left before they are extinguished. This mistake has been made repeatedly because there seemed

to be no possibility that the fire would escape. In some cases such apparently trifling things as a failure to leave enough supplies for the men left to guard an old fire has been responsible for its breaking out a second time.

Manuals of directions for fighting fire are being prepared, and when they are completed will be helpful in increasing the efficiency of the work.

The question of fire protection is now being studied more intensively in the Forest Service than ever before, and as a result greater progress is being made. Investigations, some of which have already been indicated, are being conducted along many important lines. The completion of fire plans for all the forests with provisions for their improvement in the light of experience and the results obtained through investigation, insures continued progress in the future.

THE MINNESOTA FOREST EXPERIMENT STATION

By DILLON P. TIERNEY

IN THE development of the resources of a timber region there are many problems which come within the province of the forester to solve. The fundamental principle is that the soil should be put to the use for which it is best suited. In addition to land whose worthlessness for farming purposes is self-evident, there are lands, which it is possible to cultivate, but which are so poor that their most profitable use is forestry and not agriculture. Agriculturists are usually unwilling to admit or specify that certain classes of soils are unprofitable from their point of view. In order that the forester may not be forced to confine his activities to reforesting bare rocks and mountain peaks, he must show the agricultural propagandist what are forest lands and how they can be used. Since the northern part of Minnesota is blessed with a fair proportion of purely forest land, it behooves the state to see to it that it is kept in the most profitable timber growth, just as it is now working to get the good agricultural lands under cultivation.

The importance of securing accurate data from forestry experiments conducted under favorable conditions and competent direction was realized by a number of public-spirited men of the state, and it was through their efforts that Minnesota established the first forest experiment station. By an act of the legislature, approved March 31, 1909, the state received title by gift and purchase to approximately 2,700 acres of forest land near Cloquet. This tract is to be under the direction of the university board of regents, "to be used as a practice ground, demonstration forest and experiment station for the students of the forestry department of the University of Minnesota."

Most students of forestry have undoubtedly been confronted with the problem of getting owners of large tracts of forest lands to follow certain forestry methods. Several reasons for these difficulties may exist. One of the chief reasons is a lack of knowledge as to just how any particular silvicultural method will work out under local conditions. Exact knowledge is necessary. It is not enough to assume as a basis for calculation the results that are obtained with foreign forests or with forests of some other part of the United States, although this may be very satisfying to the forester. If, for example, the forester argues that it is best to improve a heavy stand of middle-aged Norway pine by making two cuttings separated by fifteen to twenty years, the

most convincing proof he can call to his aid will be an actual and local illustration of such a system. If this proves practical and financially profitable, and if the first cut is enough to make a fair logging chance, and the remaining trees do not blow down but grow at an increasing rate, and if a number of other things turn out as they should then the forester can use this example as a reasonably safe argument. Numerous problems of this kind present themselves, and actual illustrations of their solutions are always the best arguments.

Aside from the questions of fire protection and taxation, there are many which are peculiar to the forests typical of northern Minnesota. The owners of large areas of timber lands are willing and anxious to know how their non-agricultural lands may be handled profitably; but the seemingly unimportant details and possible results of periodic cutting, planting, etc., are too hazy to carry conviction to their minds. With the hope of gaining enlightenment on these various points, the forest experiment station was provided near Cloquet, Minn., where the lumbering industry of the state is now centered.

Active work in developing this experimental tract began in April, 1910. As preliminary work it was necessary to obtain a land survey and an inventory of the timber resources. The fire danger was very great at all times, and a constant patrol was required. A system of firebreaks was planned which will include the whole area and utilize the various roads. Several miles of these "breaks" were cleared out. When completed, the firebreaks will furnish adequate protection for any experimental plots or plantings that may be made.

The larger part of the Cloquet Forest is a sand plain or "pine barrens," according to the original survey notes, on which the red pine and jack pine thrive equally well. There are also several hundred acres of light clay loam supporting a hardwood and white pine growth. This soil when cleared proves adaptable for cultivation. In the swamps are found all the plant zone gradations,—ranging from aquatic plants in the stagnant pools through sedges, cat-tails, wire-grass, sphagnum, sheep laurel, cranberry, scrub spruce, and finally into stands of merchantable tamarack and spruce.

The variation in soils on this tract makes it possible to carry on a comparatively wide range of experiments. There is also an additional advantage in having considerable growing and mature timber with which to work. Aside from the many jack pine stands, there is in one body 500,000 feet of Norway pine in a pure and practically normal stand. In another body of 350,000 feet, white and Norway pine form about equal proportions of a dense stand.

Altogether there is approximately 2,000,000 feet of white and Norway pine in several compact, even-aged stands. Plans are made to select and mark out a large number of permanent sample plots. On the plots in the mature stands, several methods of thinning will be tried, and a record kept to ascertain the relative increase in rate of growth, the effects on reproduction, young growth, and ground cover. On some plots, both under standards and on cut-over areas, broadcast sowing of several species will be tried, to determine what conditions and season of the year may prove adaptable to this method of regeneration. Under contract with the federal government, all the timber on the Cloquet Forest, with the exception of the above-mentioned selected bunches of pine, was removed last summer. Seed trees were reserved on two areas of forty acres each. Consequently, the ground which has been so recently logged over is in excellent condition to receive the attention of the experimenter.

Particular attention will be given to the work of planting the various sites to commercial timber species. About four acres of ground has been

HEADQUARTERS—IN A BEAUTIFUL GROVE OF LARGE NORWAY PINE

MINNESOTA FOREST EXPERIMENT STATION

A VIEW IN THE CLOQUET FOREST

THE STATION HEADQUARTERS IN WINTER

IN THE CLOQUET FOREST AFTER A HEAVY SNOW-FALL

MINNESOTA FOREST EXPERIMENT STATION

A NORMAL STAND OF PURE NORWAY PINE; AVERAGE FIVE LOGS PER TREE

MINNESOTA FOREST EXPERIMENT STATION

SOME OF THE SANDY RIDGES ARE ENTIRELY FREE FROM UNDERBRUSH AND REMIND ONE OF SOUTHERN PINE FORESTS

WATER OAK IN GAINESVILLE, FLORIDA,
ABOUT THIRY YEARS OLD

cleared for a nursery, and already a beginning has been made in starting the seed beds. There is ample room for growing garden truck, small fruit and an orchard, which, in addition to supplying the workmen with fresh and wholesome food, will also keep up public interest until the slower and less striking silvicultural experiments are well under way. The prospective agriculturist in this locality is anxious to know what crops may be raised, and it is quite likely that what little garden and field crops are raised will show how unprofitable it is to farm on most of the jack pine sand lands. That typical jack pine lands are unsuited to agricultural purposes has often been shown by the starving out of settlers on them, but careful experiments here are expected to give more exact information on the reasons for these failures.

In a beautiful grove of large Norway pine a two-story log building has been erected for the accommodation of the foreman of the forest. An additional log dwelling will be constructed for the technical superintendent, who in the summer time will be on the ground in charge of the experimental work. The place is about three miles from the city of Cloquet, on a good and well-traveled road. It would be hard indeed for one to find a more favorable and interesting place for free and uninterrupted research and study.

WATER OAK IN GAINESVILLE, FLORIDA, ABOUT THIRTY YEARS OLD

THE WATER OAK AS A SHADE TREE

By C. D. MELL.

TREES in every respect desirable as shade trees in towns and cities are rare. Unfavorable soil and atmospheric conditions, insect and fungous enemies and other injurious factors characteristic of the city street, limit the number of shade tree species to a very few; but when one does find a good tree for street purposes and a hardy oak at that, it becomes a matter of no little interest. The water or spotted oak of southeastern United States is that kind of a tree. It is undoubtedly one of the best street trees of the southeast, and as such it is used in practically every town in the states of Georgia and Florida, and is now rapidly replacing a good many other less desirable species in towns as far north as North Carolina. When young the tree stands transplanting very well, grows quite rapidly, and has beautiful foliage which is never too heavy to allow free circulation of air. It loves soil moisture, but, nevertheless, stands seasons of drought better than any other oak suitable for shade. It usually attains its most magnificent proportions as a street or park tree and seldom needs trimming. The water oak is free from injurious insects.

In the southeast it is the most commonly distributed of all the oaks, and is found as far north as Delaware and extends westward through the Gulf states to the valley of the Colorado River in Texas. This oak obtains its common name from the fact that it is generally found growing on the borders of swamps and streams and on rich bottomlands of rivers. Old trees of this species are often hollow at the center, forming hiding places for opossums, and for this reason the tree is also known as possum oak in Alabama and Texas.

The scientific name is *Quercus nigra* Linn. (*Q. aquatica* Walt.). The technical name of oak, *Quercus,* is taken from the Latin, but is derived from the Celtic words *quer,* meaning "fine," and *cues,* "tree," in reference to the

highly esteemed qualities of these trees. The specific name, which is the Latin name for black, was given to this tree on account of the very dark green leaves and the small dark brown colored acorns. The genus *quercus* belongs to the family of trees which produce inconspicuous flowers, the sterile being in slender green catkins and the fertile or fruiting ones solitary or clustered, appearing in the spring. The species *nigra* is of the class known as black or red oaks, which mature their fruit regularly every two years. This is contrary to what takes place with the members of the white oak group, which mature their fruit annually. The twigs are slender, light or dull red during the first winter, becoming light brown the following year. The leaves are usually oblong-obovate, gradually narrowed and wedge-shaped at the base. The apex is generally rounded or entire or less often three-lobed; the lobes are seldom sharp or bristle pointed, which is a character of the leaves of black or red oaks.

Water oak usually varies from 50 to 75 feet in height, and has a trunk from 2 to 4 feet through. The branches spread gradually from the stem and form a symmetrical round-topped head, especially good for a shade tree. Anyone familiar with the water oak will concede that it is one of the handsomest and most useful oaks of southeastern United States. Large specimens which are sometimes 100 feet high, develop a head of unusual regularity and beauty. In the moist soil near the border of a lake or along a stream, the favorite situation of this tree, it is forced upward in search of light and then forms a more or less spire-like top. In open situations with a sufficient light and growing space, the branches spread out horizontally and form the broad head which make some individuals of this tree as handsome and symmetrical almost as it is possible for an oak to become. South of central Georgia the leaves of this tree are persistent throughout the year. They remain lustrous green until they are gradually shed in the spring of the year after the new leaves have come out; in its most northern habitat, however, the leaves gradually fall off during the winter.

COOPERATION IN FOREST PROTECTION

By E. T. ALLEN.

EDITOR'S NOTE.—In this article Mr. Allen further develops the cooperative protective idea of which his association is the most striking example, an idea previously set forth by him for AMERICAN FORESTRY readers in June of this year.

EVEN in normal years, the cost to government, states, counties, towns and individuals of protecting life and property in this country from forest fires runs into millions of dollars. In bad years like 1910, it amounts to many millions. This is the cost of the work itself, not including damage by destruction. To a very great extent these expenditures are wasted and the destruction is increased by lack of cooperation; by duplicated effort and duplicated neglect in the field work itself, by inharmonious policies, and by failure to unite in propaganda and law-making forces strong and numerous enough to be irresistible if united and directed.

An invaded country meeting the enemy's army with many independent forces, fighting without knowledge of each other's strength and policies and even without attempt at conference and communication, would be regarded with astonishment by the world. It is hard to conceive of a city in which expensive fire-fighting equipment would be maintained at stations established without reference to each other's location, with the firemen scattered and unorganized, and without means of cooperation in emergencies. To the modern mind even pastimes, such as base ball and foot ball, imply team work and constant study of ideas contributed by every member of the organization. These are but a few familiar illustrations of a principle recognized in almost every line of human endeavor—that intelligent cooperation is immensely more effective than independent inharmonious action by individuals or disconnected units. No story is more familiar than that of the bundle of fagots which could not be broken until separated; no motto than "in unity there is strength."

In nothing more than in fire prevention is concerted harmonious effort essential to bring the best results. Nevertheless, with a few notable local exceptions, our several agencies most keenly interested in the subject are still facing its problems pretty much independently. Chief among these agencies are the federal forest service, the progressive element among timber owners, state forest administrations, and factions of public-spirited laymen interested only in community good. In some states only one may be active, in others all may be, but seldom do they act in thorough concert. The stage of mutual distrust and deprecation seems about past, but communion is still mostly confined to occasional conferences where papers are read and resolutions are passed. There is little systematized working provision for enabling each agency to profit fully by the interest of the others.

Leaders of field work experiment with organization systems, equipment and methods, sometimes at frightful cost, because no means exists for learning and applying the experiences of others. Independent patrolmen and fighting forces duplicate or conflict in one locality while another goes unguarded. Police authority is exerted with varying interpretation of the law. The most important work of all—teaching all classes not to start fires—is prosecuted

spasmodically and unsystematically at greater cost than would be required to do it intelligently. The writing of laws is often done by one element with an unfamiliarity with others' problems that brings minimum efficiency if not actual conflict. Particularly is it done without the knowledge of fundamental principles in state forest administration which can be learned only by study of results in other states. Good bills fail of passage, or bad ones pass, because of failure to work together effectively in making and directing public pressure upon legislatures. Underlying these difficulties of detail is the great task upon which complete success in any of them depends—establishing in American citizenship a universal and sound grasp of forest economies, including not only the relation of forest preservation to public welfare, but also those governing conditions of production and market, loss and profit, practicability of method, and division of private and public responsibility, ignorance of which now creates suspicion and prejudice between forest owner and forest user. This task calls for closer and more constant relations between all elements concerned than now generally exist.

That lack of mutual understanding and its inevitable attendants, divided effort and conflict, are the most powerful deterrents of progress and yet unnecessary has been clearly taught by the experience of the Western Forestry and Conservation Association. This organization, now well known to everyone acquainted with American forestry, was originally formed for the interchange of ideas and experiences by the several cooperative patrol associations maintained by Idaho and Washington timber owners. Quick realization that quite as important as actual fire fighting is persistent honest education, both without and within the timber industry, led to the employment of a forester and the joint financing of educational work at once more economical and more consistent than could be carried on independently.

Immediately, however, the function of the alliance as a clearing house for ideas and experience appealed to all others engaged in forest work, and it was enlarged to admit state and federal forest officials, conservation associations, and new fire organizations of timber owners in adjoining states. This broadening not only placed it securely on a footing of unselfish reliable authority recognized by the public and already extremely effective in improving laws and sentiment, but also brought about a marked change in the relation of its constituent elements. The conservation enthusiast, the federal officer, the representative of state administration, the practical lumberman—each learned that the others were good citizens and could teach him about as much as he could them. Above all, they learned each others' problems and that none could succeed without respecting all. They began to work together, with results gratifying beyond expectation, and this was accomplished not by changing human nature, but solely by providing a means by which they could get acquainted and work together.

But the Western Forestry and Conservation Association is an interstate institution extending from Montana to California and, while ready to help locally where wanted, is equally scrupulous not to force interference or conflict with the individual policy of its constituents in any particular state. This has allowed a clear view of progress by states which teaches an illuminating lesson—that progress is in exactly the measure that the states themselves have applied the principle of cooperation locally. Where timber owners have carried cooperative patrol to the fullest degree and abandoned independent duplicating systems, better protection is had for less money, and public and lumberman alike are more careful in the use of fire. Where there are the fullest and most constantly employed facilities for actual cooperation in work and finances by private owner, government and state, there is the greatest

efficiency at least expense and particularly is there the greatest advance in law-making, law-enforcing, and public sentiment generally.

It is an up-hill task at best to prevent the appalling mistreatment of American forests. Friction among those who are trying to prevent it is expensive folly and it comes from misunderstanding. Misunderstanding comes from lack of acquaintance. The real desire of public, lumberman, state and government is the same. The forest fire problem will be quickest solved where law and policy are for associating in organization and expenditure the government, the state and the forest owner.

TIMBERLAND PROTECTIVE ASSOCIATIONS

By E. A. STERLING.

WHEN the smoke of each forest fire season has blown away, we amuse ourselves by aimless guesses as to the property loss, take a few pictures of the blackened landscape, and wonder if it will be wet enough next year to prevent the destruction which our own feeble, human efforts seem powerless to stay. About this time of the year the autumn forest fire season will be on in the East; while in the West the summing up of the year's achievements and the stock taking of the damage done will be under way.

Sweeping back the sea with a broom would be child's play compared to controlling forest fires during a bad season with the pitifully inadequate facilities which have been available. States with forest property assessed at a hundred million dollars have in their munificence appropriated as much as $10,000 a year for fire protection, and then wondered why their burning wealth cast a pall of smoke over the country for weeks. With an insurance rate of one-hundredth of a cent on the dollar, some of the worst-burned states have gotten just about their money's worth. Some of the states are now more liberal, and with their awakening comes renewed hope; but the states are not alone responsible for the fire havoc which has been permitted to be wrought.

To try to tell of the various reasons why our forest fire losses have averaged the value of a battleship a month for many years would make a long, sad story. Like many sad stories, however, it promises to have a happy ending, and in this we will find pleasure.

This year, next year, and for many years, climatic conditions will largely determine whether the fire season has been a disastrous one. Each year, however, with the progress now being made, the weather will become a less potent factor, and in the exact proportion in which the human agencies triumph over the natural can be reckoned our control of forest fires.

Forest fire protection is now the chief end and aim of three active forces: the Forest Service, the states, and the fire protective associations of the timberland owners. Another less definite influence is that of public sentiment, which is slowly assuming an attitude of antagonism toward forest fires. Each of these agencies is becoming efficient in itself, and all are working together when co-operation furthers their mutual interests.

The timberland owners were the last to organize, although their need was perhaps greatest. Now that they have found the way, remarkable progress is being made, and it is this work that will be briefly outlined here.

Three years ago the Western Forestry and Conservation Association was formed, and for the first time in the history of the lumber industry mutual interests were organized for the suppression of the common evil—forest fire. This association has grown until it embraces the five states of Montana, Idaho, Washington, Oregon, and California, and is now prepared to do what the states have failed to provide for: the protection of private timberlands and the capital invested in the lumber industry.

As an association it has no individual members, but is an alliance of local organizations in the five western states. At present eight active fire associations, with about four hundred timberland owners, are included in the parent organization. Originally, there were fifteen local associations represented, but five in Oregon have turned their work over to the Oregon Forest Fire Association, and of the ten remaining, two are the Washington and Oregon Associations, which have a large membership but do no field work.

The Western Forestry and Conservation Association is the clearing house, as it were, of the affiliated associations, and as such does not spend money for direct protection. The field work is handled by the constituent organizations, and while the general plan is the same, the details vary in accordance with the local conditions. A chief fire warden directs the field operations, but a governing board outlines policies and determines the expense limits. Some of the associations undertake the entire burden of expense for their members, while others maintain only a skeleton system.

Some of the more essential features of the fire association work are flexibility in organization, so that the field force can be increased promptly in emergencies; the availability of funds to carry on the work; systematic patrol; prompt action in fighting fires which start; preventive measures, such as burning dangerous slashings, keeping railroad rights-of-way clear, etc.; cooperation between the various federal, state, corporate, and private interests concerned; and educational work among all classes.

Space does not permit of outlining the work of the various associations, nor of the developments in both the East and West which have followed the initial organization of the Western Forestry and Conservation Association. The following brief summary, however, will show the status of the fire protective association work practically up to date.

Western Forestry and Conservation Association.

This is the pioneer association, which combines fifteen local fire associations. At present its active membership includes the Northern Montana Forestry Association, the Coeur d'Alene, Pend d'Oreille, Clearwater, and Potlatch Timber Protective Associations, the North Idaho Forestry Association, and the Lincoln-Benton and Inland Forest Fire Associations. The area actually represented is about 6,500,000 acres, but nearly 20,000,000 acres are patrolled.

The assessment for actual protection varies from one to fifteen cents per acre, with an average of two to three cents. The expenses of the parent organization are provided for by an independent assessment of one-quarter cent per acre.

During the unusually bad fire season of 1910, the affiliated associations and their members spent about $667,000, but kept the fire losses on the private property represented down to about one-half of one per cent. The value of the timber property protected, including its stumpage value and as a resource, is estimated at not less than four billion dollars.

The Forester and active head of the Association is E. T. Allen, Portland, Oregon.

Pend d'Oreille Timber Protective Association.

This is one of the representative associations allied with the Western Forestry and Conservation Association.

The association was organized in 1907, and now directly protects about 350,000 acres, mostly the property of small holders.

The assessment for 1911 will amount to about two and one-half cents per acre.

The officers of the association are A. C. White, President; E. O. Hawksett, Vice-President; and T. J. Humbird, Secretary and Treasurer.

Oregon Forest Fire Association.

This association represents five local Oregon organizations, with eighty companies and individuals as members.

The timberlands represented approximate 2,000,000 acres.

The cost of protection varies from one-half to five cents per acre, with an average of about two and one-half cents.

About 350 wardens are engaged in looking after private timber holdings, and in 1910 $130,000 was spent in patrol work.

The general work of the association is summarized by the secretary as follows: "In general, the work of this association so far has been: 1st, to encourage patrol and endeavor to perfect patrols where they are inefficient. 2nd, to endeavor to so co-operate with the government, state and counties that all the fire protection work will count. 3rd, to give proper publicity to the importance of Oregon's timber resources and point out the interest every citizen has in this resource and consequently the need for its protection. 4th, to furnish a means for taking up matters of public importance, affecting the timber resources of the state, which cannot be handled by the State Forester. 5th, we also put in patrols and look after property for non-resident owners desiring this, making no administrative charge for doing this work."

The officers of the Association are: A. P. Sprague, President; Chas. G. Briggs, Vice-President; John Pearson, Treasurer; and C. S. Chapman, Secretary and Manager.

Washington Forest Fire Association.

The association is composed of Western Washington timberland owners, the present membership comprising 153 companies and individuals.

The timberland represented approximates 2,700,000 acres, and in addition, about 100 miles of railroad are patrolled.

The assessment in 1910 was two cents per acre, and will be about the same in 1911.

About 80 men are employed in addition to the inspectors.

The President of the Association is George S. Long; Vice-President, Thomas Bordeaux; Secretary and Treasurer, M. R. Hunt; and Chief Fire Warden, J. L. Bridge.

Northern Forest Protective Association.

Organized in 1910, and the first fire association to be established in the Lake States. The present membership of 100 represents slightly over 2,000,000 acres, although approximately 7,000,000 acres receive the benefit of the patrol.

The cost of protection for 1911 is one-half cent per acre.

This association is similar in organization to the Western associations, and the same excellent results are procured. Patrol and an educational campaign are the main features of the 1911 work.

The President is Thornton A. Green; Vice-President, C. V. R. Townsend; Treasurer, James E. Sherman; Secretary-Forester, Thomas B. Wyman.

New Hampshire Timberland Owners' Association.

The only association of the kind in the East. It has about thirty members, representing about 1,500,000 acres.

The association maintains lookout stations, patrols, etc., and co-operates with the federal government and the state under the provisions of the Weeks law, whereby funds are appropriated for fire protection in certain states. It has six permanent patrolmen and puts on additional men during seasons of fire danger. The total number of patrolmen in the fall will be about fifty.

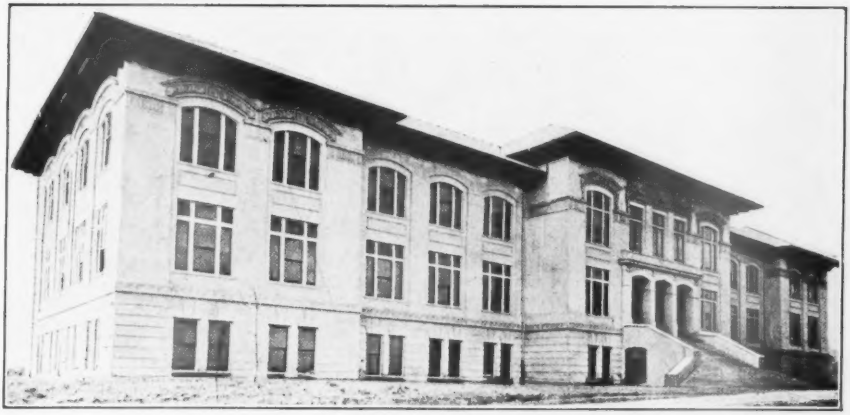
The cost of protection to the association is about five-eighths cent per acre.

W. P. Brown is President; W. H. Bundy, Vice-President; and F. H. Billard, Secretary-Treasurer-Forester.

The total area actually represented by the voluntary timberland protective associations, after three years growth, is about 15,000,000 acres; but not less than 30,000,000 additional acres benefit by the patrol. The efficiency of the protection on this area is not exceeded anywhere outside of the National Forests. If ever there was a trial by fire it was last year, and the associations came out of it with remarkably small loss.

The measures they are applying are mainly common sense methods which only needed systematizing to become effective. Patrol, telephone lines, trails, tool caches, and education have been recognized for years as essentials of forest fire protection. The new features developed are largely administrative. The ability to get together and work together in applying a definite system is what has accomplished results. That it will pay cannot be doubted; while the fact that the lumbermen are willing to contribute liberally for fire protection that protects shows that their business judgment is sound. They will accept forestry just as willingly *if it can be made to pay.*

What is needed now is an extension of the fire association idea to the forests of the East and to the pine lands of the South. Nor is it a far cry to almost universal co-operation between timberland owners which will reduce their fire losses to a nominal figure. Much depends on the protective associations now in existence; if they fail, few would have the heart to try again; if they continue to be effective, the way is open for similar protective measures in all of our private forests. The states and the federal government can greatly assist the organized private timber owners by protecting their own lands and by co-operation and sane legislation.



AGRICULTURAL BUILDING, HOME OF THE SCHOOL OF FORESTRY, UNIVERSITY OF GEORGIA

A SUMMER SCHOOL CAMP OF THE GEORGIA FOREST SCHOOL

FOREST SCHOOLS, VI. GEORGIA

A LESSON IN DENDROLOGY

CALIPERING TREES IN A MIXED HARDWOOD STAND,
COLLEGE FOREST, UNIVERSITY OF GEORGIA

FOREST SCHOOLS, VI. GEORGIA

FOREST SCHOOLS OF THE UNITED STATES

VI.

The University of Georgia

THE Forest School of the University of Georgia was created in 1905 by an initial foundation given by George Foster Peabody of New York, and it was opened in the year 1906-1907 as a division of the State College of Agriculture, which is an integral part of the University. It is located at Athens. For practice work near at hand there are about one hundred and fifty acres of the college farm that are woodland. There is also some land once cleared, but not suitable for tillage. The wooded portions are being brought under forest management and the non-agricultural lands are being reforested.

Of the work of the department one course in the economics of forestry is designed to bring out the importance of the forest to the state and nation. Two give elementary instruction in forestry to familiarize agricultural students with the management of farm woodlots and the execution of forest working plans. Still others give instruction in professional forestry for those who intend to go into the lumber business or to follow forest engineering as a profession. By means of publications and lectures before schools, farmers' institutes, lumbermen's associations and other interested organizations, an endeavor is made to spread popular education in forestry throughout the state. Work is done in co-operation with the owners of woodlands through co-operative agreements such as are made in some states by the state departments of forestry. For the completion of the four years' course, the degree of Bachelor of Science in Forest Engineering is given.

The professor in charge of the courses is Alfred Akerman, who was a graduate of the Yale Forest School and later on its faculty, and was the first state forester of Massachusetts, leaving that position to take charge of the new foundation in Georgia. Professor Akerman emphasizes the fact that his school is not laying stress upon professional training. Professional courses are given as a matter of convenience to those students who wish to begin their professional studies as undergraduates. But he advises these men that they should supplement their course with graduate work there or elsewhere, preferably where they can have the best laboratory equipment and the help of a faculty of specialists. It is obvious that the whole field of professional forestry cannot be adequately taught by one instructor, and Professor Akerman increases one's confidence in the strength of his work by his frank admission of this fact.

The school is doing especially good work with the seniors in agriculture. There is a large amount of woodland on Georgia farms, and a practical knowledge of forestry is an essential part of the equipment of a Georgia farmer.

The list of courses of the department contains ten subjects: Economics of forestry, farm forestry, a longer course in farm forestry, dendrology, silviculture, forest protection, forest mensuration, forest management, lumbering and utilization, and wood building materials.

All candidates for the degree are required to live for two months in summer between the sophomore and junior and junior and senior years at a lumber camp, sawmill or turpentine distillery, to keep a diary of each day's work, make an herbarium of the flora of the locality and prepare a thesis of the operations being carried on. It is preferred that students secure some employment connected with the operations. This practical work takes the place of the summer camp which was last held in 1910 in Florida.

A magazine devoted to the forest, fish and game interests of the South is edited by the professor of forestry, assisted by the forestry students. While this is primarily a students' publication, it contains material of interest and value to the general reader of timberland owner.

The school is doing careful work along conservative lines and making the most of its facilities.

COLLECTING LODGEPOLE PINE SEED

By A. M. COOK,

Supervisor Arapaho National Forest.

Editor's Note.—A general account of methods of collecting and handling seed in the national forests by Sydney Moore was published in this magazine for March, 1911. See also a series of pictures, "Reforesting in the National Forests," May, 1911. The Present article deals more intimately with a particular phase of the work on one forest, the Arapaho in Colorado.

IN addition to the regular duties of the rangers on the national forests, such as overseeing grazing and timber sales, and building cabins, roads, trails, and telephone lines, the annual harvesting of the cone crop has become a very important task for which considerable preparation and forethought are necessary. In the state of Colorado no kind of tree seed is more desired for reforesting the waste places of the mountain country than lodgepole pine.

Although it grows to no great size, lodgepole pine is of importance whenever it is found in abundance. Without its help the rancher would be at a loss for material for fences, log houses and outbuildings, and telephone poles. By far the larger part of the Colorado mines are timbered with material from this pine. But its use in the round does not exhaust its possibilities. Good common lumber, hewn railroad ties, and box boards are more and more in demand as Colorado grows and its resources are developed, and the Forest Service does well to join hands with nature in the propagation of a species which will fill this demand.

It takes two years for the seeds of lodgepole pine to ripen. During the first summer the little cones form near the tips of the branches towards the tops of the trees. They are a rusty red or purplish color, and shade in so well with the colors of the bark and foliage that they are hardly noticed unless especially sought for. During the first winter and the second spring the young cones develop rapidly. By July of the second summer they have reached full size, and can readily be seen glistening bright green among the leaves towards the outer ends of the branches. The tiny seeds themselves are black and remain concealed inside the cone until the squirrels, the action of the alternating heat and cold of the mountain climate, or the scorch of a for-

est fire parts the woody cone scales and allows them to fall to the ground. For two years the ranger has had a chance to size up the coming cone crop, decide on the most likely localities in which to harvest it, and lay his plans for the work early in the summer. He has reported to his superior officer the results of his field observations, and, in view of a shortage of seed in one locality, plans can be laid well in advance to make good the deficiency by concentrating on places where the crop is known to promise abundance.

There is only one good way to collect the cones of the lodgepole pine. Pulling the cones from the branches by hand, or cutting them from their stems with a keen-edged, sickle-like knife, or knocking them off with a pole have all been found to be both slow and uncertain. Only with difficulty can as many as a bushel of cones a day be secured by any of these ways. But the gay little pine squirrel, frisking about the woodland, leaping from tree to tree and chattering at you frantically as you walk beneath, has come to the ranger's help. Along about the middle of August these care-free denizens of the forest world begin to realize the need of providing themselves with a store of food against the coming of the long winter. Every pine gives its tribute to them of its best and ripest. Instinctively the squirrel knows the best cones, and few that are wormy or empty ever are tucked away in a squirrel hoard. Scampering to the topmost branches, the squirrel cuts off the cone from its tough stem with his keen little teeth. He will seldom bother to conceal his hoards more than by the protecting shelter of an old log, or a shallow hole by the base of a rock or stump. Here he piles up from a few quarts to several bushels of pine cones. But with increasing riches Mr. Squirrel gains craft. "Put not all your eggs in one basket," is an adage which he apparently knows by heart. For he will not store long in any one place. Under this log and that log, behind that rock and in this old root he believes in experimenting with many exposures and many storehouses. For the cellar must not be too damp and let the cones mold, nor must it be where the snow is likely to get too deep and too hard packed. As one walks through the forest in autumn he will find that there is scarcely a down log that does not conceal on its uphill side a store of pine cones. For this reason it is practically impossible for a cone gatherer to take away more than a part of a squirrel's hoards. Furthermore, a hoard emptied one day will generally be found by the end of a week to have been partly or wholly replenished, unless, as rarely happens, the little worker has been frightened away.

Towards the middle of August, in most localities, the squirrels have actively begun collecting their winter's supply of cones. By September 1, in a favorable year, the fire season is nearly over and the ranger's other lines of summer work are drawing to a close. Providing himself with sacks, a bucket and good stout gloves, the ranger starts for that part of the forest where his two years of observation have prepared him to find a good supply of stored cones. Moving the old logs he lays bare the hoards he is after. The bucket is quickly filled, emptied into one of the gunny bags, and replenished from the next promising supply. All of the cones found in squirrel hoards are not equally good either in the number of fertile seed they contain or in the ease with which they can be made to give up their seed. The small gray cones, for instance, which have been on the trees for several years, are not as good as the fresher, more plump brown and purplish cones, which generally are not over three years old. The cone gatherer aims to put few of the gray cones in his sack.

The gunny bags hold about two bushels of pine cones, and it is not unusual for a man to gather six or eight sacks full in an 8-hour day. When a good-sized pack load has been assembled the ranger brings up his horses,

with their pack saddles and panniers, and carries the cones to his station or other point where it has been decided to concentrate the work of extracting the seed. As it takes at least two pounds of seed to sow an acre of ground, and not much over a third of a pound of seed can be expected from a bushel of cones, the number of cones that must be collected annually is large, and one man gets only about enough seed in a day to sow two and one-half acres. It is not customary, therefore, to depend wholly on the results of the rangers' collecting.

After the busy haying season is over, men, women, and children of the country are free to turn out on the fine autumn days and gather the cone harvest. About forty cents a bushel is paid, and sacks are furnished the pickers. When coming to town for ranch supplies, or at times when the teams are not working, the sacked cones are brought in to the cone house at Fraser, measured and stored in bins, to await extraction. Helped thus by their neighbors, the rangers easily assemble all the lodgepole pine cones desired.

When the arrival of winter puts an end to collecting, all the work centers in the cone house. Inside this is a good-sized dry kiln, built of two thicknesses of lumber and lined with tight paper. The kiln is provided with tiers of racks or trays, between which are coal heaters. The front is arranged to open so that the wire trays can be lifted out bodily for filling and emptying. The kiln should easily hold 15 or 20 bushels of cones at one time. After the trays are filled, fires are built in the stoves and the temperature raised to 100° F., the heat being regulated by means of trap doors on the top of the kiln. For four hours the cones are kept at this moderate warmth. Then for four hours the temperature is kept at about 130°.

After the eight hours have elapsed, all except a very few of the cones are open, and a vigorous tapping or shaking causes the released pine seed to scatter out. This shaking of the cones can be done mechanically by revolving them in a long cylindrical framework covered with coarse wire screening. One end of the cylinder is raised 8 inches higher than the other, and as the cones pass down, tumbling over and over, the seeds rattle through the wire on to the sheets spread beneath and the empty cones drop from the lower, open end into the wastebox. As all experiments in reseeding are done with known quantities of dry, clean seed, it is very desirable to separate the seed, fresh from the cones, from the wings, chaff, pine needles, and dirt. So the ranger sweeps up the seed from the sheets below the shaker, and puts them twice through a fanning mill, similar to those used by farmers in winnowing grain. The clean seed is packed in cotton bags that hold 4 pounds each, and stored away until the time comes for sowing in the field.

BILTMORE FORESTERS HELPING IN LOADING LOGS

RETURN TO CAMP AFTER A HARD DAY'S WORK

FOREST SCHOOLS, VII. BILTMORE

RETURNING FROM AN EXCURSION TO THE PRIMEVAL OAKS OF GERMANY

BILTMORE FORESTERS STUDYING THE GROWTH OF LONG LEAF PINE

FOREST SCHOOLS, VII. BILTMORE

FOREST SCHOOLS OF THE UNITED STATES

VII

Biltmore Forest School

THE Biltmore Forest School is unique in the facts that it is connected with no college or university and is a traveling school. It is about to enter upon its fourteenth year of existence. It was founded by Dr. C. A. Schenck, forester of the Biltmore estate in North Carolina, in the late summer of 1898; and during the first eleven years of its career, it was maintained on the Biltmore estate. At that time the school was spending one-half of the year in the cut-over woodlands near Biltmore and the other half in the primeval Pisgah Forest, owned by Mr. George Vanderbilt, near Biltmore. In 1909 the school severed its connection with the Biltmore estate, retaining, nevertheless, its original name "Biltmore Forest School."

The faculty consists of its director and chief lecturer in forestry, Dr. C. A. Schenck, of Dr. H. D. House, chief lecturer on dendrology and botany, and of a number of teachers selected from various universities on account of their special fitness for presenting topics closely related to forestry in concise and attractive form.

Professor George L. Clothier, of the Mississippi State Agricultural College, lectures on his specialty, prairie planting; Professor Collier Cobb, of the University of North Carolina, lectures on forest geology; Edgar D. Broadhurst, of Greensboro, N. C., on forest law; Franklin Sherman, Jr., state entomologist of North Carolina, on entomology; Dr. St. George L. Sioussat, of Vanderbilt University, on economics; Professor H. O. Allison, of the University of Missouri, on animal husbandry; Dr. Hermann von Schrenk, on timber preservation; R. S. Kellogg, on forest statistics; and Harry C. Oberholser, of the United States Biological Survey, on forest zoology. In addition, various members of the Forest Service have had the kindness to deliver annually at the school a series of lectures dealing with topics in national forestry. There is a strong probability of the co-operation with the Biltmore Forest School in its European headquarters of Sir William Schlich, upon his retirement from the chair of forestry at Oxford. Ernest Thompson-Seton will spend a week with the school in its Michigan camp.

The plans and methods of the school are framed on the belief that forestry can be taught in the forests alone; that no lectures are so good as those illustrated by object lessons; that a forest school must be a technical school; and that an American forester will miss his calling unless he be a trained modern lumberman, superior in knowledge and hence in efficiency to the lumberman of the past. At Biltmore science is taught with a view to the training of practical workers. The school is a small one, and the students are kept in close personal touch with the instructors.

Travel is an essential means of forest education; travel, however, is not conducive with the student body to systematic study. The Biltmore Forest School gains the advantages and avoids the dangers connected with travel in the following manner: It has established a circuit of five distinct headquarters; and its travels are restricted to the five journeys between them.

Each headquarters is situated in the midst of the woods, and every afternoon is spent in the woods, all lecture work being confined to the forenoon hours. The headquarters are

(1) The primeval forests of western North Carolina, near Biltmore.

(2) The primeval forests and cut-over lands near Cadillac, Michigan.

(3) The national and private forests on the Pacific coast of Oregon near Marshfield.

(4) The Adirondacks forests near Saranac Lake.

(5) The German forests near Darmstadt.

Each lecture course is so arranged as to be delivered at that of the five headquarters which offers the best object lessons illustrating the topic treated in the class work.

The course at Biltmore comprises twelve full consecutive months, uninterrupted by any vacations whatsoever. What, indeed, is the need of periodical relaxations for the juvenile mind when the student is permitted to spend every afternoon in the woods? During these twelve consecutive months are offered 620 full lecture hours, of 60 minutes each, on technical forestry. The Biltmore Forest School has its own text books, printed for the benefit of the students, in keeping with all the courses on forestry proper, so as to do away with the necessity of time-taking dictation. The work of the school is hard, concentrated, and intensive. No one should join the school who is not willing to do conscientious work, to the extent of his ability, during twelve consecutive months.

After the lapse of the twelve months at the school—during which the five headquarters are visited alternately—the Biltmore student is placed at a practical test: He is sent to the backwoods and must take a hand in lumbering, logging, and sawmilling during six consecutive months. After proving his efficiency when put to the test in the woods, he is granted his degree of Bachelor of Forestry. A Bachelor of Forestry who has been engaged for at least two years in practical forestry and lumbering and who submits a thesis approved by the Biltmore faculty on a forest topic, is eligible for the degree of Forest Engineer.

The school is open to men at least twenty years of age who are either college graduates or graduates of a high school. All candidates for admission must prove a knowledge of mathematics up to plane trigonometry.

The mental friction taking place at the Biltmore Forest School between the "high school men," many of whom have had some practical experience in lumbering, and the "college men," who are usually devoid of such experience, has proven to be particularly productive of good results.

A student may enter at the beginning of any of the principal courses at any of the five headquarters where such courses are given. The various courses are given in rotation, and the student remains until he completes the entire circuit. A newcomer is benefited by the more mature experience of the senior, and the senior is benefited by the many queries which the newcomer asks of him during the field work.

Applicants for admission are advised of the dates at which a vacancy occurs in the Biltmore ranks. The name of the successful applicant for admission is placed on the so-called "waiting list" opposite the date of his admission.

The expenses necessarily incurred by the Biltmore student living economically during his twelve months' attendance at the school amount to $1,100. The school's permanent address is Biltmore, N. C., regardless of the headquarters within the circuit which the school is occupying at a given date.

NOTE.—The activities of this school in Germany were the subject of an article and numerous pictures in AMERICAN FORESTRY for June and August, 1910.

EDITORIAL

TWO CONVENTIONS

THE Third National Conservation Congress gave evidence by its composition and the seriousness of its work that the movement it represents is growing to maturity. There was a notable absence of the political claptrap which seems to be regarded by the daily press as material for space and headlines. Workers and experts were much in evidence in the membership of the congress and the practical problems of conservation were approached with a view to their solution. Great credit is due to President Wallace and his associates on the executive board for giving this direction to the work of a convention which might so easily have been made a vent for the discussion of irrelevant issues. There will be a new interest in the work of the congress because of what was done and what was avoided at Kansas City, and it is safe to say that J. B. White, the next president of the congress, will continue this policy of useful service.

It is refreshing to have had this congress held without an outbreak of the wordy and useless warfare over state rights. So far as it applies to the problems of conservation, this issue is dead. We do not mean that all the details of the relation between state and nation in dealing with natural resources are finally adjusted. There are always likely to be open questions of this kind as new conditions arise. Nevertheless, the state rights idea, as some of our western friends uphold it, is dead, and a prompt recognition of that fact will be greatly to the advantage of the country. Now that we know something of the problem of future population that we have to face, and of the growing scarcity of those natural resources upon which the general prosperity depends, it is unthinkable that the nation will turn over its birthright to states or to groups of individuals. If there are phosphate beds in one state, shall they be handed over to the profit of a group of individuals when the agricultural lands of the whole nation are needing this essential element of soil fertility to maintain an agriculture that shall feed a great population which certainly will not have its center in that state? This is an illustration which may be extended through the whole list of non-renewable resources, and the same broad principle covers the renewable resources.

Certain western men of somewhat narrow vision see only in those things that are within their borders wealth pertaining to the state itself, and they wish to have full control of them. This view is a very natural one, but, as we have said, narrow. The western states wherein this feeling finds expression are the outgrowth of a common heritage of the American people. The interests and destiny of the Pacific coast, the Atlantic seaboard, the central valley, the plains, and the country of the big mountains, are bound together by history, sentiment and intimate business connections. The physiography of the United States unites its people as that of Europe divides the nations. Under these circumstances the solution of our difficulties and of differences as between states or sections lies not in the advocacy of discredited theories of political administration, but in getting together through mutual understanding and co-operation upon the common ground of nationality in which each

state shall play its part in the direction of its own domestic affairs. It was decided several years ago by a court from whose decision there is no appeal, which set a final seal upon the work of John Marshall and his associates, that even the original states are not independent and sovereign, but that sovereignty resides in the nation. The states west of the Alleghenies, organized, chartered and settled by the original thirteen were the bond and guarantee of that nationality. The principles of national conservation rest on this foundation.

There was another convention last month in Denver, the so-called Public Lands convention, where this outgrown political idea which was taboo at Kansas City had full swing. This Denver meeting was simply an attempt to set back the clock of national development,—a task impossible. United effort of the whole people to conserve the natural resources of the country for the common good is the only safeguard for continued prosperity of the American people.

A SILENCE BROKEN

THE recent Secretary of the Interior made a remarkable address at Denver last month, remarkable from its savage personal note and, coming from a former administrative officer of the government, for its failure to discriminate between the functions of legislative bodies and administrative bureaus. That there are abuses of bureau power is unquestionable. Bureau officials are human and liable to human errors, and among them is that ancient failing of man who is "dressed in a little brief authority." We have had occasion of late to criticise the adherence to the letter rather than the spirit by one of our most useful scientific bureaus, but we would not on that account abolish the Geological Survey and turn its highly specialized scientific work over to those whom Mr. Ballinger vaguely describes as the people's representatives. In fact, we are inclined to think that if the people's representatives had steered a straighter course in harmony with the people's will, the case which has aroused the criticism referred to would have been settled in a better way for all concerned.

Mr. Ballinger criticises the practice of investing certain bureaus with the power of making rules and regulations having the effect of law as being tantamount to the substitution of the bureau chief for the law maker. It may again be admitted that abuses can arise under such a system, but when there are large affairs to administer, what shall we do about it? Congress cannot direct the details of all the countless administrative functions of the government. The people's representatives have their hands full now. Some power must be given to public servants employed under authority of Congress, and it should be borne in mind that such servants are always subject to the control and direction of the people's representatives in Congress. If their methods are bad, they can be changed by authority of law. Of course, the answer from the gentlemen with whom the ex-secretary has allied himself, is that the national property should be given up to the state. But this, as we have said elsewhere, is a dead issue. The people of this country will not hand over their national birthright to be administered by a group in which they are not represented. To do so would be to run counter to the strongest point embodied in Mr. Ballinger's argument.

The animus of the ex-secretary's argument is directed against the Forest Service, as was shown by the climax in which he denounced what he calls the most gigantic political scheme ever attempted in the history of the republic,

the alleged attempt to "dismember the Interior Department by taking from it all those bureaus that had anything to do with the public domain, and, together with the forestry bureau, concentrate them in another department where their combined strength would be utilized to promote propaganda designed to operate the public domain as a national estate for the conservation of certain bureau chiefs." The only comment that needs to be made on this amazing charge is that it is childish. If Congress should see fit to change the organization of the Interior Department or any other department of the government, as it has heretofore done, in the interests of a more logical arrangement, we do not know of any particular sanctity attaching to the present organization of any of the departments which should stand in the way of such action. Such action would have to be the action of the representatives of the people whom Mr. Ballinger believes should dictate in all these matters.

On the whole, it does not seem to us that the ex-secretary has strengthened himself by the illogical and splenetic manner in which he has broken silence.

EUROPE AND AMERICA—A COMPARISON

IN A RECENT number of the *American Lumberman*, Mr. Charles Willis Ward, of Michigan, makes a very clear and detailed comparison between the conditions and opportunities of forestry in Europe and America. The points made by Mr. Ward are familiar in discussions of foreign and home forestry but he has arrayed them in a systematic way which presents the case interestingly and comprehensively to the general reader. He mentions among the advantages enjoyed by the European forester the long establishment of forestry in Europe upon a business basis; the supply of trained and experienced foresters and the abundance of skilled labor at a labor cost less than in the United States; the high standing of forestry as a profession; the freedom of forestry from professional politics and the greater ease in securing funds to carry out public forestry work; the better system of taxation of forest lands in vogue in Europe; the existence of a market for all forest products including some that are waste in American forests, although Mr. Ward believes that this objection will soon be largely removed in the United States; and finally the scarcity of large coal deposits and absence of mineral oils and gases which tend to hold the value of wood for fuel purposes at a comparatively high rate.

On the other hand, the European forester works under the disadvantage of a scarcity of low-priced land available for forestry use and the high cost of food products which maintains the permanently high value of agricultural land and renders remote any prospect of a reduction in the future cost of land needed for new forests.

The American forester has these advantages, as Mr. Ward points out: An abundance of cheap land available for forestry use; the existence of large tracts of virgin forests containing heavy stands of natural timber which may be subjected to permanent forestry treatment; an abundance of low-priced agricultural lands which will for some time tend to maintain a comparatively low value of food supply; less competition from substitutes for wood in building materials and a wider market and more active demand for staple forest products; the introduction of iron and steel in structural work of large buildings maintaining a constant demand and increasing values for better grades of finishing wood; and, finally, the enormous railroad mileage requiring

the use of wood for railroad ties and their renewal to such an extent that extensive forests must be maintained to supply material for this purpose alone.

These are all practical economic considerations which any man can understand and when the balance is struck it can be seen that forestry in this country is not so much at a disadvantage in comparison with Europe as we sometimes assume.

AN ESSENTIAL DIFFERENCE

VICE PRESIDENT SHERMAN has a national reputation for a cheerful and almost irresponsible optimism. In a recent speech which is receiving considerable attention because of its antagonism to the views of the duty of one generation to the next which are fortunately gaining ground among us, he is quoted as saying that he is the best conservationist who utilizes the forces of the air and all the different forces of the earth for the advancement of mankind and turns them into comfort and conveniences and makes them supply necessities and in other ways lessens the burdens of this generation; and further "I believe each new generation is equal to the task of discovering some new thing to take the place of any existing natural resources. I am willing to give the coming generation credit for being as smart as we. I believe that they will find fuel."

This is sublime optimism in view of what we know of reckless waste and destruction in our management of the natural resources of the earth. Unfortunately it runs counter to established fact. We believe with Mr. Sherman that every resource which nature has provided should be utilized to the utmost for the welfare of mankind. We believe that the coming generations will be amply capable of handling their own problems, but we also believe, and upon this point Mr. Sherman seems to be indifferent, that as managers and workers in this great producing plant, we should leave it in good working condition,—not stripped and damaged through wasteful use and improvidence; that we are trustees and should not impair the working capital of the world.

This we regard as a fair interpretation of what is generally known as conservation,—a term too little understood and hence too often irrelevantly criticised. To translate this idea into the field of forestry, which is typical: we must utilize our forests to the full measure of their productivity, but we must not impair that productivity, as others will come after us who will need the forests as much as we.

It will be seen that while Mr. Sherman's position is right as far as it goes, he omits a very essential consideration which we as responsible human beings with a debt to the past and a responsibility to the future cannot ignore.

A PERSONAL WORD

ON THE first of November Edwin A. Start retires from the secretaryship of the American Forestry Association and the editorship of AMERICAN FORESTRY, and he wishes to take this opportunity to express to many friends his grateful appreciation of the support they have accorded to him during the two years that he has been the executive officer of the Association.

The advance of forestry makes the work of such an association as this of increasing importance and defines its functions and its opportunities with

greater definiteness than in the early years of general propaganda. Successful forestry must rest upon a firm foundation of popular understanding and broad cooperation, and the American Forestry Association is the necessary link that unites the professional foresters and the great body of laymen. Its work of education and organization will be needed for many years, and the retiring secretary urges, out of his experience and knowledge, a continued, increased and revitalized support of the Association by the American public for whose interest alone it exists.

NATIONAL FOREST WORK

Relief for Homesteaders

Settlers on national forests under the act of June 11, 1906, will no longer have to pay for a survey, as they have had to do in the past on unsurveyed lands, when the claim goes to patent. This relieves many settlers under the act, commonly known as the forest homestead law, from a burdensome expense. Relief from this burden has been brought about by an agreement between the Secretary of the Interior and the Secretary of Agriculture, whereby surveys made by employees of the Forest Service will be under the supervision of the Surveyor General so that they can be accepted by the General Land Office as final.

Hitherto it has been necessary to make two surveys. Under the terms of the forest homestead law, national forest land cannot be opened to settlement unless the Secretary of Agriculture has recommended to the Secretary of the Interior that it be listed for settlement; and listing is not possible until a survey has been made. The Secretary of Agriculture has no authority to list any land unless an examination has shown that the land is more suitable for agriculture than for forest purposes. So when land is applied for, employees of the Department of Agriculture are sent to ascertain its character, and at the same time make a survey of it by metes and bounds if a survey is necessary.

This survey, however, could not be accepted by the land department as a basis for patent, because only surveys under the supervision of the Surveyor General can, under the law, be accepted as a basis for passing title. In consequence, under the procedure provided for when patent is sought to unsurveyed lands, the settler on land within a national forest has had to pay for a second survey. This has been felt to be especially hard because it has subjected settlers on national forests to an expense which settlers on surveyed public lands do not have to bear. Since it merely duplicated the work of the first survey, there seemed no reason why this first survey might not answer both for listing the land and for patenting it.

The survey for listing, made by forest officers, has always been without expense to the prospective homesteader. Under the new arrangement, the field expenses of the survey will continue to be paid by the Department of Agriculture, so that the applicant will merely be called on to meet the cost of checking up and platting the surveys by the Surveyor General. This will remove one of the greatest objections to the working of the forest homestead law. The officials of both the Department of Agriculture and the Department of the Interior are pleased that the way has been found, through co-operation in the surveys, to simplify the procedure, cut out a duplication of work, and lessen the cost of settling upon agricultural lands within national forests.

The Appalachian National Forest

The work of examination of lands for purchase for national forests in the Appalachian Mountains is in progress and data is being gathered for submission later to the commission, which will probably meet soon after the reassembling of Congress. The report of the Geological Survey on the White Mountain lands will not be made until spring. Experiments are in progress from which the experts of the Survey expect to obtain definite scientific data which will be conclusive from the point of view which they have adopted as to the effect of forest cover upon streamflow on the White Mountain watersheds. The report has been postponed to await the result of these experiments, but is promised in the spring in time for action before the close of the current fiscal year.

The price at which some of the White Mountain lands are held may stand in the way of their purchase by the government. These prices in some cases are higher than the government can pay and unless the owners will meet the government half-way, their attitude may be an obstacle in the way of the accomplisment of this great public improvement.

CURRENT LITERATURE

REVIEWS

The Development of British Forestry. By A. C. Forbes, F. H. A. S., chief forestry inspector to the Department of Agriculture for Ireland: Illustrated. pp. xi, 274. New York: Longmans, Green & Co.; London: Edward Arnold, 1910.

In his preface the author expresses the belief that "British forestry, after lying almost dormant for about five hundred years, is really developing at last." The book is an attempt "to present a general review of the whole problem of afforestation as it must appear to the landowner and the practical forester." It will be noted that afforestation, or reforestation, is the aspect in which forestry largely appears under British conditions. The elaborate report of the royal commission on coast erosion will be recalled as a further indication of this. Mr. Forbes, the author of the present volume, is known as the author of a book on "British Estate Forestry," published a few years ago, which has had readers among those interested in forestry in this country.

In his opening chapter the author brings out the natural connection between mountain and forest, and also makes a pregnant suggestion in pointing out that the lack of forests in the British Isles is in large measure due to alienation of land to private proprietorship, while on the continent, wnen the need of forest preservation became evident, large tracts still were controlled by state, crown, church or commune, or "possibilities existed of resuming possession of them on easy terms." This historic fact suggests that we have begun none too soon to reserve our government forest lands, and it may be added that we have already experienced the difficulty of resuming public ownership of what has once been alienated. It is being recognized throughout Europe, Mr. Forbes concludes, "that private enterprise will not or cannot maintain a supply of timber which will meet the needs of modern civilization." These and other generalizations Mr. Forbes supports with facts and figures.

He next takes up the forest requirements of the United Kingdom. He finds that estimating at 3,000,000 the present timber-bearing acreage, an addition of 4,000,000 acres is needed for economic timber growing and must be taken from the agricultural and grazing land. This may be compared with the estimates of the royal commission previously referred to, a report by the way which Mr. Forbes regards as financially unsound. The relation of agriculture to forestry development is the theme of the third chapter and here we find reflected the opinion applied on the continent and generally growing abroad that more or less fairly good land can and should be applied to economic forestry, and that forest planting should not be done upon land that will not produce profitable results.

The relations of climate and tree growth form the subject of another chapter, followed by one on soil and surface conditions in the British Isles. The sixth chapter deals with the need for improved methods and practice in British forestry. In this connection the author points out three features of British as compared with continental forestry: (1) the small size of British woods; (2) their mixed or indefinite character; and (3) their lack of density, deficient yield during their early and middle stages of development, and the low quality of their matured timber. This is surely a sufficient basis for suggestions for improvement. A natural sequence of this is a chapter on the economic value of the British forest flora. Some financial aspects of British forestry are considered and several tables showing British and continental yields accompany this chapter.

The last chapter treats of the problem of the state and private owners. The author has evidently given much thought to this topic and his views, while relating especially to British conditions, have in many respects general application. They are carefully and conservatively formed. Mr. Forbes believes in the necessity of private ownership of small woodlands and close co-operation between the state and the individual in forest management. One of his criticisms of the royal commission's afforestation report is that it ignores this necessity and assumes that the state can entirely take the place of the individual owner.

Comprehensive examinations like this of a national forest problem in its various phases are valuable not only in their own country, but for comparison in other countries. This book is well reasoned, well written, and well illustrated. It is comparatively free from difficult technicality and can be studied by the layman with profit.

Land Problems and National Welfare. By Christopher Turnor, with an introduction by the Right Hon. Viscount Milner, G. C. B., G. C. M. G., etc. pp. xvii, 344. London: John Lane, the Bodley Head; New York: John Lane Company, 1911. *Price, $2.50 net.*

This is a thoughtful study of land problems as the basis of social economics, and political reforms. Its author is a landowner, who, says Lord Milner in his introduction, "combines with practical knowledge of agriculture a high sense of the duties of his position, and, what is perhaps more uncommon, a keen sympathy with the farmer and the laborer." Mr. Turnor in his own preface quotes at length from the report of the Roosevelt country life commission, saying that its conclusions are applicable in England and "form an excellent preface to the whole subject of rural development." It may be said in return that while this volume applies to English conditions which differ so materially in many ways from ours, there is much in it that is worth the attention of our American students of rural development. Indeed we find that so far as the economic and practical conditions of agriculture are concerned this book might almost have been written for an American audience. It treats successively of the landowner, the farmer, the rural laborer, education and agriculture, political economy and the land, small holdings and agriculture, agricultural organizations, politics and the land, the land and the empire. In view of the present acuteness of the forestry problem in England and the opinion advanced on excellent authority that some millions of acres of indifferent agricultural land should be utilized for reforestation, it is disappointing to find so broad and intelligent a student of conditions as Mr. Turnor ignoring this side of the land question altogether.

Woodworking Safeguards for the Prevention of Accidents in Lumbering and Woodworking Industries. By David Van Schaack. Aetna Life Insurance Company, Accident and Liability Department. Hartford, Conn., 1911. pp. 217. *Price, $1.00*

The Aetna Company has done a good service in publishing this volume. Appliances of wide variety for safeguarding workmen from the logging plant through the various factories are described and illustrated with numerous pictures designed to make their point with great clearness. The author does not claim that he has included all patented or home-made safety devices in use in the woodworking industries, but this survey of the field is very comprehensive, nevertheless. We are having it brought home to us that we Americans must be more regardful of human life and limb and not think solely of the machine and the product. The wood producing and working industries are in the dangerous class and should be safeguarded in every possible way.

Trees and How to Know Them. A Manual with Analytical and Dichotomous Keys of the Principal Forest Trees of the South. By W. A. Lambeth, M.D., Ph.D., Professor of Field Botany in the Summer School of the University of Virginia. pp. 52. Atlanta, Richmond, Dallas: B. F. Johnson Publishing Company, 1911.

A key for the identification of species with brief descriptions of leaves, flower clusters, and fruits, and a glossary of botanical terms. The south is less well supplied than the north with such instruments for local tree study and this will probably be serviceable. It includes the common trees of the south, both indigenous and introduced. Emphasis is placed upon the leaves, as being easiest for the beginner.

Ornamental Shrubs of the United States (hardy, cultivated). By Austin Craig Apgar. pp. 352. New York: American Book Company, 1910.

This little manual by the well known author of "Trees of the Northern United States" was completed by Professor Apgar just before his death and edited by his daughter. It is intended for the use of those who are not botanists but who wish to know by name the shrubs to be seen in parks and private grounds. For its purpose it is convenient and well arranged. Its main parts are three: leaves, flowers and fruit; keys to the genera; and descriptions of the shrubs. There is a glossary and index. The illustrations are from the author's sketches.

The Forests of the Philippines

A bulletin on "The Forests of the Philippines" has just been issued by the Philippine Bureau of Forestry under the direction of Major George P. Ahern. The author is Dr. H. N. Whitford, chief of the division of investigation, who, in a course of studies extending for several years and covering practically all accessible portions of the archipelago, has gathered together and embodied in this bulletin the most complete and authentic discussion of the subject which has yet been prepared. The book will be found of great value by all who are interested in the forests of the Philippines and their products, whether the point of view be that of a scientist, a business man, or a lover of nature. In many respects the forests of the Philippines are among the most varied and wonderful in the world, and now almost for the

first time there is given the layman an opportunity to learn how to know and to appreciate them.

The bulletin is published in two parts. Part I gives a discussion of the general type of vegetation with estimates of the extent of the virgin forest, second growth forest, grass lands and cultivated areas. The forests themselves are discussed under twelve separate types, five of which are known as the Dipterocarp types, comprising seventy-five per centum of the entire area of the virgin forest and forming the bulk of the timber manufactured in the islands. The Molave, Mangrove, Beach and Mossy types are treated more briefly and a discussion of their economic importance is also included.

Under the general heading of "Wood Uses" is given a brief discussion of the kinds of wood employed for different purposes, such as house construction, piling, wharf building, railroad ties, etc. "Lumbering in the Philippines" is another heading. It contains a discussion of the market, logging and milling operations, transportation and labor. Dr. Whitford estimates the annual cut of timber at eighty-eight million board feet. The number of steam sawmills has increased from thirty-one in 1907 to sixty in present operation. Under "Minor Forest Products" are discussed such subjects as fuel, resins, oil, gutta percha, almaciga, rubber, etc. An exceedingly valuable feature of the bulletin is a number of diagrams showing from just what sources all of these minor products are derived. For instance, on page fifty-seven is a table showing the sources of wild and cultivated gutta percha and rubber, including all of the trees in the islands from which these two products may be obtained. There is also a chapter of the bulletin devoted to a discussion of the relation of the government to the forests and their products; here is shown by diagram how the government disposes of the forest products and what the charges are. How long-term exclusive licenses, or "concessions," may be obtained is also fully discussed. Part I is illustrated with twenty-eight full page plates which add greatly to its usefulness.

Part II treats of the "Principal Forest Trees." Non-technical descriptions are given of one hundred and six trees which include all of the principal timber species whose lumber is of importance in the commercial markets. Brief mention is made of some two hundred and seventy-seven other trees of the Islands that are found in the forests or else are cultivated for ornament or for fruit. This part of the bulletin contains one hundred and three illustrations showing the bark, leaf and wood characteristics of the principal species.

This bulletin is not for free distribution, but is sold at a price of $1.25 per copy, postage prepaid. All requests should be addressed to the Director of Forestry, Manila, P. I., remittance being made only by postal money order.

MONTHLY LIST FOR OCTOBER, 1911

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EDUCATION

Ranger Course at Colorado School of Forestry

Announcement is made by the Colorado School of Forestry of a ten weeks' ranger course to begin December 13, 1911. The aim of the course is to give in a limited time as much instruction as possible in forestry and related subjects to those who are interested or are actually engaged in forest ranger work. Until January 1, the course will consist of lectures at Colorado Springs. After that date the instruction will be transferred to the school's reserve at Manitou Park, twenty-five miles west of Colorado Springs. The lectures will be given by the faculty of the school of forestry, by members of the faculty of Colorado College, of which the school is a department, and by the Forest Service. They will comprise discussion of the fundamental principles of silviculture and forest administration, forest law, grazing problems, construction of roads, trails, telephone lines, cabins, etc., diseases of trees and forest entomology, identification of the more important woods and trees, and other subjects of practical value to the ranger or woodsman. The course includes also lectures on general botany, geology, and first aid to the injured. It provides instruction in mechanical drawing suitable to the preparation of forest maps, mathematics, and some other elementary subjects.

The field work at Manitou Park will be conducted by the faculty of the School of Forestry. It will consist of practice in surveying, estimating, forest mapping and description, preparation of volume and growth tables, marking of trees for cutting, study of lumbering at the school's mill, instruction in packing, horseshoeing, etc.

Information concerning the course may be obtained from Philip T. Coolidge, Director, Colorado School of Forestry, Colorado Springs.

The University of Missouri

Instruction in the elementary principles, history and economics of forestry, has been given in the University of Missouri for over five years. It was not, however, until 1910 that a demand for a forest education of a more professional nature was believed to exist. In that year a department of forestry was created in the College of Agriculture. The work of instruction actually began this fall with four juniors and several sophomores and freshmen enrolled in the four years' course.

The many forest schools that have been established in recent years have been located in the northern and western states, with the exception of the department of forestry in the University of Georgia. It had been felt for some time that there should be a Forest School established to satisfy the demand of students from the southern and southwestern states who seek a training in the profession of forestry.

The location of a forest school in the state of Missouri is an ideal one. Situated on a plateau 600 feet above the sea level and 30 miles from the Missouri River, the university contains within its own campus natural examples of the southern hardwood forests along the bottomlands of the creeks emptying into the Missouri River, and in the higher lands on the plateau is found the flora of the northern states. It is the meeting ground of northern and southern species. To the south lie the Ozark Mountains where the university owns over 50,000 acres of timbered land, the woods laboratory of the forest school.

Here are found many types of trees, from the pine lands and upland hardwoods to the swampy conditions of the Mississippi bottomlands. To the north lie the prairies and to the west the great plains each with its particular forest problem.

Located in the College of Agriculture, the forest school will have the advantages that forest schools in similar land grant colleges possess, of having the fundamental sciences taught in long established departments of the university, and of calling on the other colleges for instruction in such subjects as surveying, engineering, entomology, economics, etc.

Twelve weeks of the course will be spent in practical forest work in the Ozark Mountains on the university forest. Here the work will consist in estimating timber, investigating lumber operations, making topographic and logging maps, and in marking timber for cutting. It is planned to acquire a portable sawmill so that the students can make studies of the different processes of a small sawmill operation and become proficient in the handling of such mills and in the manufacture of lumber.

At Columbia a twenty-acre tract of young timber has been devoted to the use of the department of forestry as an experimental and demonstration tract, and several acres laid out for a forestry nursery. The university owns many planted groves of forest trees such as catalpa, black and honey locust, hackberry, ash, pecan, etc.

One of the latest of the forest schools to be established, the University of Missouri Forest School already has a woods equipment unsurpassed by any other. The course will be developed along practical lines, fitting students for professional forest work.

Harvard Forest School

In the September number of this magazine, in a list of institutions giving instruction in forestry, the forest school of Harvard University was listed with the undergraduate schools, its course being described as a four years course in forestry in the Lawrence Scientific School for the degree of B. S. in forestry. In the same list the school was properly treated as a graduate school with a two years graduate course. It should not have been included in the undergraduate list. The Lawrence Scientific School has been out of existence for three years and no course in forestry is given in Harvard to undergraduates. The course in the Harvard graduate school leads to the degree of M. F. and the school is in the same class with the graduate schools of Yale University and the University of Michigan. The list published in September was furnished by the Forest Service and published without correction. The Harvard Forest School was properly listed in AMERICAN FORESTRY'S own list published in December, 1910.

STATE WORK

The Chestnut Bark Disease

The Pennsylvania legislature at its last session enacted a law providing for a commission to investigate and combat the chestnut blight, and appropriating $25,000 for the expenses of the commission, whose members are to serve without pay, and a further sum of $250,000, available on approval of the governor, for the performance of the duties required. The commission is made up of Winthrop Sargent, chairman; Harold Pierce, secretary; T. N. Ely, Samuel T. Bodine, and George F. Craig. The commission has opened headquarters in Philadelphia and engaged as its forester S. P. Detwiler, assistant professor of forestry in the University of Minnesota. In a detailed account of the work thus far done in the state, published in *Science*, September 29, Deputy Commissmissioner of Forestry Williams says: "In order that valuable time might not be lost while the organization was being perfected, the Department of Forestry of the state organized the outside work by sending men first to an instruction camp and then starting them out as scouts in lower York County, to locate infection and report on its prevalence.

Reports from these parties are now being received daily. With additional parties organized, York County will soon be covered and the work will then continue up the west side of the Susquehanna River and westward along the Maryland line. A large amount of preliminary work will be done this year in the hope that the winter work of taking down infected trees may accomplish the desired end, preventing further westward spread of the infection."

In Massachusetts the disease has been studied by Arthur H. Graves, a United States government expert, who says in his report to the state forester:

"The chestnut bark blight has been found in seventy Massachusetts towns. The disease appears to be more general in the south-central and southwestern parts of the state. This is perhaps due to the fact, that these portions are nearer to the badly infested regions in New York and Connecticut, and possibly also because on the whole more chestnut occurs here than in other parts of the state. In the southern part of Berkshire county the disease has already done a great deal of damage. There is every reason to believe that if the disease continues to spread as it has within the last half dozen years, it will ultimately cause tremendous havoc in Massachusetts, as it has already done in New York, New Jersey and Connecticut." Supplementing the report of Prof. Graves, Prof. Metcalf, pathologist in charge of the bureau of plant industry, U. S. Department of Agriculture, writes State Forester Rane that "during the past summer the disease has spread more than in all its previous history. Whatever is done in Massachusetts, as well as in every other state north of Virginia, must be done within the next year. Otherwise we definitely face the issue of the extinction of the chestnut tree.

The methods of control already adopted in New York and Pennsylvania are the only practical methods that we know of controlling the disease. These methods are, briefly, the location and destruction of the small advance infestations beginning in that part of the state farthest away from the center of infestation. We cannot too strongly advise the eradication as soon as possible of all advance infestation of this disease in Massachusetts, beginning in the eastern part of the state. It is probably already too late to save the southwestern part of the state by any method."

An illustrated bulletin on the disease for the information of the public has been issued by the state forester.

In this connection the following communication to AMERICAN FORESTRY from Mr. T. L. Hoover of New York is of interest, as it offers a theory of a possible underlying cause of the development of this disease:

"Never before in the annals of forestry has disease wrought such havoc with any species as has the chestnut-tree blight. On Long Island, and in western Connecticut, southern New York, and New Jersey the scourge has utterly devastated the chestnut forests. And the last Pennsylvania legislature manifested its concern over the situation by appropriating one-quarter million dollars to investigate and combat this fatal and progressive disease.

While the origin of the infection is a mystery, and although its remedy remains undiscovered, certain well known facts suggest some reason for the complete and overwhelming fatality of the blight. It is significant that the habitat of the chestnut along the Atlantic seaboard is co-extensive with the earliest settled parts of America. Thus from colonial times the species in-

vited destruction, commending itself, as it does, to man's use through the many distinctively admirable qualities of its wood. And not alone the standing timber, but the succeeding generations were endangered through the popularity of its edible fruit. So complete has been the consumption of chestnuts that the species, deprived of opportunity for natural regeneration, must have been doomed long since, were it not for the remarkable faculty of producing sprout growth from the stump. Fortunately the chestnut possesses the power of coppicing to a degree far beyond most other trees.

The inevitable result—as is evident to every careful observer—is that the present-day stand of chestnut consists of about ninety per cent coppice (not merely second, but third and fourth growth), a small number of aged giants—ancient survivors of the primeval forest—and only a negligible quantity of seedling trees.

But the power of coppicing, unfortunately, is a diminishing one, exhaustive of the tree's vitality and at length fatal. A forest composed of members, either aged and failing or else with vitality depleted and vigor impaired by ill-treatment, can offer little resistance to a malignant foe. Admitting, on the one hand, such a forest condition, and presupposing, on the other hand, the existence of an infectious disease, and one comprehends the awful ravages to be witnessed wherever the blight has spread.

Whatever success we may have in curbing the present epidemic, one lesson stands forth clearly: *the viciousness of the old method of successive and excessive coppicing*, practiced and handed down by our forefathers. *There remains to devise a correct silvicultural system for the chestnut*, if we hope to save and maintain the species in the future. For verily, the iniquities of our fathers have been visited upon the chestnut and upon us unto the third and fourth generation."

Massachusetts

Under legislation passed during the last session the fire protection work of the Massachusetts forest service has been greatly strengthened. An expert state fire warden has been added to the state forester's staff and will give constant attention to the equipment, organization, and training of the forest wardens of the towns. A patrol system has been inaugurated under the co-operative clause of the Weeks law. A system of fifteen observation towers has been planned to cover the whole state and nine or ten of these have already been put in use. They have telephone connections, and one of them, on Mount Wachuset, in the central part of the state, has demonstrated its usefulness already by the prompt reporting, resulting in the prompt extinguishing of thirty fires within a few weeks after its establishment. M. C. Hutchins, who acquired his experience in New York state in active service, is in charge of this part of the Massachusetts forestry work.

New Hampshire

Under a co-operative agreement between the state and the United States Department of Agriculture an exhaustive study of the wood-using industries of New Hampshire will be made. The work will be in charge of agents of the Forest Service, and more than 700 New Hampshire manufacturers who use wood have been asked to furnish information. The major part of the timber cut in New Hampshire is used for general construction and for laths, railroad ties, poles, mine props, bridge timbers, and fence posts, but in addition a large quantity goes to meet the demands of the wood-using factories which convert material into commodities of many uses and many kinds. It is these factories which are to be studied in the New Hampshire investigation. Similar studies have been completed for other states—Massachusetts Kentucky, Illinois, Maryland, North Carolina, and Wisconsin. One point which will be brought out by this study is the extent to which the forests of New Hampshire or outside sources produce the woods used by the manufacturers. In 1909 New Hampshire stood twenty-fourth among the lumber-producing states, but among the New England states it stood next to Maine. It is probable that New Hampshire holds a more important rank as a user of wood than it does in production.

The supreme court of the state has decided that the law for the purchase of the Crawford Notch by the state was invalidated by the technical error through which Governor Bass signed the bill without the amendment as it passed the legislature. This prevents action by the state until another legislature can convene and repass the measure.

NEWS AND NOTES

The Third National Conservation Congress

Nearly twelve hundred delegates attended the sessions of the Third National Conservation Congress at Kansas City, September 25, 26 and 27. Since the first preliminary gathering in Washington, probably no conservation assembly has adhered more strictly to the line of actual conservation than this one. President Wallace had made it very clear in advance that the disappointments of the Saint Paul meeting were not to be repeated.

Quite naturally with so distinguished a leader of agricultural development at the head of the congress, the key-note of these meetings was the conservation of the soil. This was struck in an able address at the opening session by President Wallace, and it was followed by a number of speakers. Together with this the improvement of country life, along the lines indicated by the country life commission, was considered as a necessary adjunct to the development of agriculture along the best and highest lines.

The program was not crowded as so many programs of similar gatherings in years past have been with speakers of political prominence, although there were on the program such men of national note as President Taft, Mr. Bryan, Dr. Wiley, Secretary Fisher and Judge Lindsay.

The President confined his address strictly to the subject of agricultural development and did not introduce any of the moot public questions of the hour. An able address by Captain J. B. White on the third day of the congress dealt with practical forestry in Europe and America.

An amendment was adopted at one of the sessions of the congress giving all national associations which have conservation committees a member on the advisory board of the congress. This would include such organizations as the National Association of Manufacturers, the National Board of Trade, the Daughters of the American Revolution, and the Federation of Labor. Another amendment proposed by J. B. White as a result of Judge Lindsay's address in behalf of the child included conservation of human life in the objects of the congress.

The resolutions of the congress recommended the early opening of the coal fields of Alaska on a leasing system, the fields to remain under national ownership until such times as states may be created in that portion of our territory; the enlargement of the powers of the Interstate Commerce Commission for further supervision of railway business; the establishment of a parcels post; the development of inland waterways; the movement looking toward the safeguarding of the national health; and a system of free schools which should be organized and conducted so that the great purpose for which the congress exists will be realized through the work and lives of men and women trained in health, homemaking citizenship and industry. The resolutions referring to forestry and the public lands were as follows:

FORESTRY AND LANDS.

"We commend the efficient work of the federal forest service, and particularly urge upon Congress the need for more liberal financial provision for protection of the national forests from fire, and the desirability of making the army available without delay whenever needed to supplement such protection.

"We also appreciate the forestry progress being made by many states, believing it not only the function but the duty of the state to safeguard its forest resources by liberal appropriation for fire prevention; by acquisition and conservative management of state-owned forest lands; by encouraging the practice of private forestry on timberlands and wood lots in every way, especially through reform in forest taxation, and by providing for the educational work necessary to secure all these ends.

"We commend the increasing effort at better forest management and protection by timber owners themselves, and urge upon all such the study and emulation of the several co-operative systems for this purpose.

"We urge the co-operation of public and private educational authorities in instilling the principles of forest economics in the minds of the young of today, who will be the doers of tomorrow.

"The public lands should be safeguarded from losses through natural agencies and negligent or thriftless use; that they should be so cultivated and improved that they may pass to each coming generation with increased fertility and productivity and that they should forever be used as sites for homes in which the strength and spirit

of the nation may be conserved for the general welfare of mankind.

"Approving the withdrawal of public lands pending classification and the separation of surface rights from mineral, forest and water rights, including water power sites, we recommend legislation for the classification and leasing for grazing purposes of all unreserved lands suitable chiefly for this purpose, subject to the rights of homesteads and settlers or the acquisition thereof under the land laws of the United States, and we hold that arid and non-irrigable public grazing lands should be administered by the government in the interest of small stockmen and homeseekers until they have passed into the possession of actual settlers.

"We favor the repeal of the commutation clause of the homestead law and the disallowance of homestead entries of land chiefly valuable for its timber at time of filing.

"We hold that mineral deposits underlying public lands should be transferred to private ownership only by long time lease with revaluation at stated periods, such leases to be in amounts and subject to such regulations as to prevent monopoly and needless waste, and that in case of doubt as to the availability of such mineral deposits, or while they are awaiting exploitation, surface rights to the land should be transferred only by lease under such conditions as to promote development and protect the public interest.

"We hold that phosphate deposits underlying the public lands should be safeguarded for the American people by appropriate legislation, and that export of phosphates and other natural or manufactured material should be limited and regulated by law.

"Realizing that the productivity of our soil depends upon water supply; that one of the chief losses of the farm is destructive soil erosion; that the freshets and floods due to storm and thaw waters are destructive to property and even of life; and knowing through experience in this and other countries that the waste and destruction due to unregulated runoff are largely susceptible to control by appropriate agricultural methods, we hold that the aim of every farmer should be to make his farm take care of the water naturally reaching it."

Officers were elected as follows: President, J. B. White, Kansas City; executive secretary, Thomas K. Shipp, Washington; treasurer, D. Austin Latchaw, Kansas City; recording secretary, James C. Gipe, Clarks, La.

North Carolina Forestry Association

At a meeting of the officers and executive committee of the North Carolina Forestry Association September 21, a constitution was adopted for submission to the annual meeting of the association in January. It was decided for the present to concentrate the efforts of the association towards (a) the reduction in the annual drainage to the forests of the state from fire (b) the prevention of insect depredations in our pine forests, and (c) the introduction of methods of management which will insure adequate reforestation.

With these objects in view it was determined to collect statistics of the annual loss from forest fires in the different counties of the state and have them published separately in the county papers, for the information of the local population. The formation of small local associations in affiliation with the state association will be strongly advocated and encouraged for the purpose of increasing the interest in forest protection and for forming centers for the collection of statistics on forest destruction.

The reforestation of the cut-over and abandoned lands of the state both by natural and artificial means will be strongly urged by the association.

A New American Arboretum

The late William Pryor Letchworth, well known for his large public spirit and many good works, left his noble estate, Glen Iris, at Portage, New York, to the state for a park. The American Scenic and Historical Preservation Society, which is the custodian under the deed of gift, has decided upon a policy that harmonizes well with Mr. Letchworth's interests and the spirit of his gift. The purpose is to make the park a great arboretum. Of this the *Rochester Democrat* says:

The park, which comprises about 1,000 acres, especially adapted to forest growth, will be transformed into an immense arboretum for testing the adaptability of all kinds of forest trees, native and foreign, having in view the necessity of ultimately restoring the forests of this country. The plan has been well devised, and contemplates eventually furnishing material for planting forests of vast extent with trees which have been tried out and which have been found to be best adapted to the varying climatic and other conditions which are found in the United States.

It should be understood at the outset that the plans of the American Scenic and Historical Preservation Society in nowise will militate against, but will enhance, the instruction and pleasure of the people who, in the last analysis, are the owners of the park. It is made plain by Mr. Dow that it is the intention of the Scenic Society to operate the Letchworth Park arboretum on the lines followed at the Glasnevin Royal Botanic Gardens at Dublin, the Arnold arboretum at Boston, and the Highland Park arboretum at Rochester, which is ranked with the two first named

by Sir Frederick Moore, of Glasnevin Gardens, and Dr. Charles S. Sargent, director of the Arnold arboretum.

It requires more than superficial consideration to realize the importance, both to the present generation and to posterity, of planting an experimental forest of 1,000 acres and applying to it, for 100 years and more, the scientific methods adopted at Glasnevin, the Arnold aboretumn and the Highland Park botanic gardens. A comparatively few years of trying out of every variety of forest tree adaptable to American soil, and the elimination of undesirable varieties, will enable the authorities almost immediately to bring into activity the functions of the great arboretum as a supply nursery. Thus the Letchworth arboretum will within the short space of a decade become the progenitor of similar arboretums throughout the entire country.

The popular study of shrubs and plants in the Highland Park arboretum has already had its effect in the direction of education. The grounds and yards of the numerous homes which have been established under the shadow of Highland Park are already ornamented with choice trees and shrubs which have been tried out and approved by the expert horticulturiests who have charge of the beautiful arboretum at the park.

New England Farmer as a Source of Supply

Economists concerned with the country's timber resources are constantly confronted by the apparent fact that the commonwealth can conserve timber (because it can exempt its own timber from taxation), but conservative forestry is impossible for the taxpaying individual. It appears, however, that, even under the present adverse taxation conservative forestry perhaps may be practiced by the American farmer at a profit. It may be possible, though, only in a well settled country close to a steady local demand.

Investigating the farmer's wood lot as a serious proposition, an editorial representative of the American Lumberman while in Boscawen, N. H., recently found there a concrete example of a farmer's wood lot operated apparently at a profit. Forty years ago George L. Pillsbury, of Boscawen, bought forty acres of land for $1,000 and set it aside as a wood lot. Even at that date he believed that timber could be made a profitable farm crop. The conditions were somewhat favorable to the success of the experiment, as Mr. Pillsbury was a builder and required native timber in his operations. During the forty years he has practiced conservative forestry he has converted the timber that decayed or developed serious defect into cord wood and the mature timber into building material, shingles, etc. Of exact figures none are at hand. It is known, however, that this forty yielded twenty cords of wood a year, aside from building material. Thus far in 1911 the lot has produced one car of spruce pulpwood which totaled eight and nine-tenths cords and brought $8 a cord f. o. b. station. In addition, 1,500 feet of hemlock sleepers were taken out this year and they brought from $16 to $20 a thousand. The wood output this year was thirty-five cords at $4.50 a cord, the 1911 production being a little heavier than usual. A few years ago Mr. Pillsbury sold seventy-five trees for $13 a thousand on the stump. They scaled 51,420 feet and brought him $668.46, more than two-thirds the price of the original forty.

The only figures that would be actually illuminating would be those showing just what had been taken off the forty for a period of years, the net price it brought (less the labor cost of taking it off), with a corresponding charge against the lot of interest on the original investment, taxes paid, etc. It is presumed that if conservative forestry was actually practiced and only mature timber was removed the wood lot is in as good condition today as forty years ago. If this is true there has, of course, been no depreciation. The trouble with this kind of a proposition is that it may look profitable on its face, but when proper charges are made against it, such as cost of superintendence, etc., the actual profit vanishes.

That an operation of this kind supplying a neighborhood need might be profitable is likely also, but an operation on similar lines of a thousand times the magnitude, subject to long shipments of the manufactured product and to meet the competition of saw mills operating on undervalued virgin stumpage, would be impossible.—*American Lumberman.*

Banana Stalks for Paper Pulp

Paper for October 4 has an article on "Banana Stalks and Their Value," by Harry D. Maddox. Banana stalks are among the many products that have been considered from time to time as possibly available for paper pulp. Apparently nothing is to be hoped for from them, however. The banana is a type of plantain, and a close relative of the *musa texilis* of the Philippines, from the leaf stalks of which is obtained the valuable cordage and ultimate paper fibre known as manila hemp. The banana fibre is just as worthless as the manila hemp is valuable.

The yield of fibre in a practical test turned out to be practically three per cent, while the length of boil and proportion of lye puts the material out of the question for papermaking. Mr. Maddox describes the results of tests of paper made from banana stalk pulp.

In the finished paper, he says, there are many defects, which completely neutralize any hopes which may have been held by promoters of the fibre. The surface is dotted with sugary specks of white, while the tear of the stock is exceedingly brittle. It has, moreover, the appearance of a dry manifolding paper and is exceedingly transparent. The color is what may be termed a dirty brown gray, wholly unfitted for any use. Altogether, banana paper may be classed with sunflower, tobacco, and the many other fibrous materials much discussed by those who know little of the real qualifications of a paper making fibre.

No Supply Exhaustless

The words "exhaustless supply" having been revived recently in connection with the Canadian spruce forests reaching north from the Great Lakes to the Arctic Circle, the *Mississippi Valley Lumberman* notes the stunted and scanty character of the growth in the northern part of the region referred to, and adds these wise words of caution: "The word exhaustless has been used a good many times in connection with the timber supply of this and other countries, but its full meaning has not been realized. We must recognize, however, that methods of cutting have been revolutionized and are still in process of revolution. While the per capita consumption of lumber in this country is still increasing, we believe the rate of increase is losing some of its acceleration, or will within the next few years. On the other hand the per capita consumption of pulp wood is probably increasing very rapidly. Possibly, before the available supply of pulp timber is much nearer depletion the consumption will have been reduced to a point where the scientific renewal will equal the demands made upon the forests. But the word 'exhaustless' as applying to timber supply, has become obsolete in the lexicon of the lumberman, and timber prophecies have been proven unsafe."

Kennebec Valley Protective Association

A protective association has been formed by timberland owners of the Kennebec valley in Maine. The object of this corporation as set forth is to protect the timberland owners where the means employed by the state are inadequate, in order that property in forest land may have the same security that other property enjoys, by promoting and encouraging the practice of forestry upon private land, by encouraging the propagation and guarding of the fish and game, and by the development of the storage reservoirs on the ponds and lakes.

The officers: E. P. Viles of Skowhegan, president; George M. Stearns of Waterville, Forrest H. Colby of Bingham, John C. Hutchinson of Bangor, W. J. Lanigan of Waterville, and Louis Oak of Greenville, vice-presidents; Forrest H. Colby, secretary and treasurer; E. P. Viles, W. A. Gilbert, and Roy L. Marston, directors.

The corporation will have its headquarters at Skowhegan, a capital stock of $10,000 in five-dollar shares and will, through its directors, employ wardens and men to fight fires when necessary, the expenses to be paid by the stockholders in proportion to their acreage, but the entire assessment never to exceed $10,000 in one year.

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